

PITTSBURGH
VALVE, FOUNDRY
AND
CONSTRUCTION CO.
PITTSBURGH, PA.



T. W. Atwood.

1930

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Designers and Builders of

Every Description of
Valves, Fittings and Appliances
for the Installation of Steam
Gas, Water, Air and
Hydraulic Piping

Dealers in

Pipe, Pipe Fittings and Supplies



ATWOOD

PITTSBURGH, PENNSYLVANIA, U. S. A.

CATALOGUE NO. 4

Notice

THIS catalogue supersedes all previous catalogues and price lists issued by this Company.

Lists herein and quotations thereon are subject to change without notice.

Terms: All prices unless otherwise stated will be F. O. B. Pittsburgh, Pa., net cash thirty days without discount for prepayment.

All agreements are contingent upon strikes, accidents or other causes beyond our control.

Material proving defective when used for the purpose ordered will be replaced, but no claim for labor or damage will be allowed. No goods will be taken back or credited unless our consent has first been obtained.

PITTSBURGH VALVE, FOUNDRY
AND CONSTRUCTION CO.

1924

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

OFFICES AND WORKS
26th STREET AND ALLEGHENY VALLEY R. R.
PITTSBURGH, PA.

BRANCH OFFICES

New York, N. Y. 30 Church Street
Philadelphia, Pa. Widener Building
Boston, Mass. 19 Milk Street
Cleveland, Ohio Kirby Building
Chicago, Ill. Monadnock Building
Detroit, Mich. 162 to 166 Woodbridge Street

REPRESENTATIVES

Young and Vann Supply Co. Birmingham, Ala.
R. J. Cooper, Monadnock Building San Francisco, Calif.
C. H. Jones Co., 206 Southwest Temple St. Salt Lake City, Utah
Mountain States Machinery Co., 325 First National Bank Building,
. Denver, Colo.

PREFACE

IN presenting our Catalogue Number 4, we do so with gratitude toward the engineering and power using public.



In this catalogue will be found a full line of Atwood goods comprising valves, fittings, etc., for all uses and pressures necessary for complete piping installations.

The first half of the book is devoted to price lists and descriptions of the various materials. These are grouped in the order of pressures from the lowest to the highest; the valves and fittings being grouped together as a unit for each pressure.

The second half of the book pertains to engineering data, giving dimensions of all valves, fittings, etc., as listed in the first half. The grouping here follows the order of the first half of the book. The data given will be found to be of valuable use for the draftsman, engineer and contractor in designing or estimating any description of piping installation. Many of the tables of general data have been compiled for our own use and will not be found elsewhere.

We are always ready to give our customers the benefit of our experience and aim to supply every need of the trade and solicit correspondence on any point not set forth in this catalogue.

PITTSBURGH VALVE, FOUNDRY
AND CONSTRUCTION CO.

ORGANIZATION

Growth—In the year 1900 the Pittsburgh Valve, Foundry and Construction Company was organized from the combination of Atwood and McCaffrey; Shook Anderson Manufacturing Company; Pittsburgh Valve and Machine Company; A. Spear and Sons; and the pipe fitting department of the Wilson-Snyder Manufacturing Company. In 1912 we took over the valve department of Henry Aiken and in 1916 the piping business of the Kennedy-Stroh Company, successors to Best Manufacturing Company.

Experience—The constituent companies of our organization had been engaged for many years in the manufacture and erection of pipe work for the power plants and steel works of the Pittsburgh district. For this type of work their product had to be reliable beyond question, which led to heavier standards for given pressures than were in general use in other sections of the country. This policy was continued by us until the adoption of the American Standard of 1914, at which time all our valves and fittings were made to conform to this standard. With the development of the recent high class Power Plants, we have designed a line of cast steel valves and fittings to take care of the extreme pressures and temperatures called for. We have furnished and installed a large amount of these valves and fittings for this class of Power Plants.

Location—Our plant is located at Twenty-sixth Street and the Allegheny River, in the heart of Pittsburgh. Sidings from the Pennsylvania and Baltimore and Ohio Railroads enter each one of our shops. We are within a short distance of the main freight stations of all railroad lines. Thus, we are in a position to handle rush orders as well as large orders requiring carload shipments. We also have facilities for shipping by water, having our own wharf on the Allegheny River.

Equipment—Our factory equipment is complete. Our buildings consist of Iron Foundry, Steel Foundry, Brass Foundry, Machine Shop, Pipe Cutting and Threading, Bending and Welding Shops, and a large Warehouse. All of these shops are up to date. Our machine tool equipment is being constantly extended and kept up to modern requirements. Many of our machines have been designed and built specially for the service and we are able to produce work quickly and economically. Our foundry equipment is entirely modern and constant supervision of all departments give absolute uniformity of product. All material entering into our castings are carefully selected by chemical analysis in our laboratory and only the highest grade used. Our steel castings are made by

the Electric Furnace Process and each melt is carefully analyzed and tested for strength, which assures only the best high grade castings, which are properly annealed relieving all casting strains.


The capacity of all departments both as to size and quantity is such that we are able to handle all classes of work in our line to the complete satisfaction of our customers.

SCOPE OF WORK

The Manufacturing Department is equipped for making valves, fittings and piping required for any service. We are further prepared to cast and machine all classes of general castings.

The Erection Department is prepared to install valves, fittings or piping anywhere and under any conditions. We constantly employ a large corps of expert fitters, and competent superintendents and foremen are in charge of this work. Our field engineers are placed in charge of large contracts.

The Engineering Department is prepared to design or estimate any piping layout. We make a specialty of taking care of unusual conditions, and will be glad to submit designs and estimates for special valves or equipment on receipt of specifications.

Product—All goods manufactured by us bear our trademark  and we believe in maintaining its reputation. We guarantee our goods for the service listed.

Carefully conducted destruction tests of valves and fittings have been made up to 36-inch sizes and the data secured are an invaluable aid in the making of new designs.

Our Pattern Equipment is complete as will be seen from inspection of the goods illustrated in the following pages. It is therefore unnecessary to have to bolster up light patterns for heavy duty and we wish to warn our patrons against the criminal practice of selling light or competitive goods for severe service. That a valve or fitting will stand a certain test without rupture is absolutely no guarantee, for it may thereby become so damaged as to be utterly unreliable for any further service.

Do Not Take Chances, for life and property depends on the security of your piping.



Plant of the Pittsburgh Valve, Foundry and Construction Company, 26th Street and Allegheny Valley Railroad,
Pittsburgh, Pa.
The Allegheny River in the Background



COLFAX STATION
Duquesne Light Company
Dwight P. Robinson
Company
Designing Engineers



So. Meadow Station
Hartford Electric
Light & Power Co.
Stone & Webster, Inc.,
Designing Engineers



BALTIMORE
REFINERY
American Sugar Refin-
ing Company
Stone & Webster, Inc.,
Designing Engineers

MODERN POWER PLANTS
In Which Are Installed "Atwood" Valves,
Fittings and Piping



Penn Public Service
Corp., Seward, Pa.
Dwight P. Robinson
Co., Designing
Engineers

**MODERN POWER PLANTS
IN WHICH ARE INSTALLED "ATWOOD" VALVES,
FITTINGS AND PIPING**



**EMPIRE DISTRICT ELECTRIC
COMPANY**
Joplin, Mo.



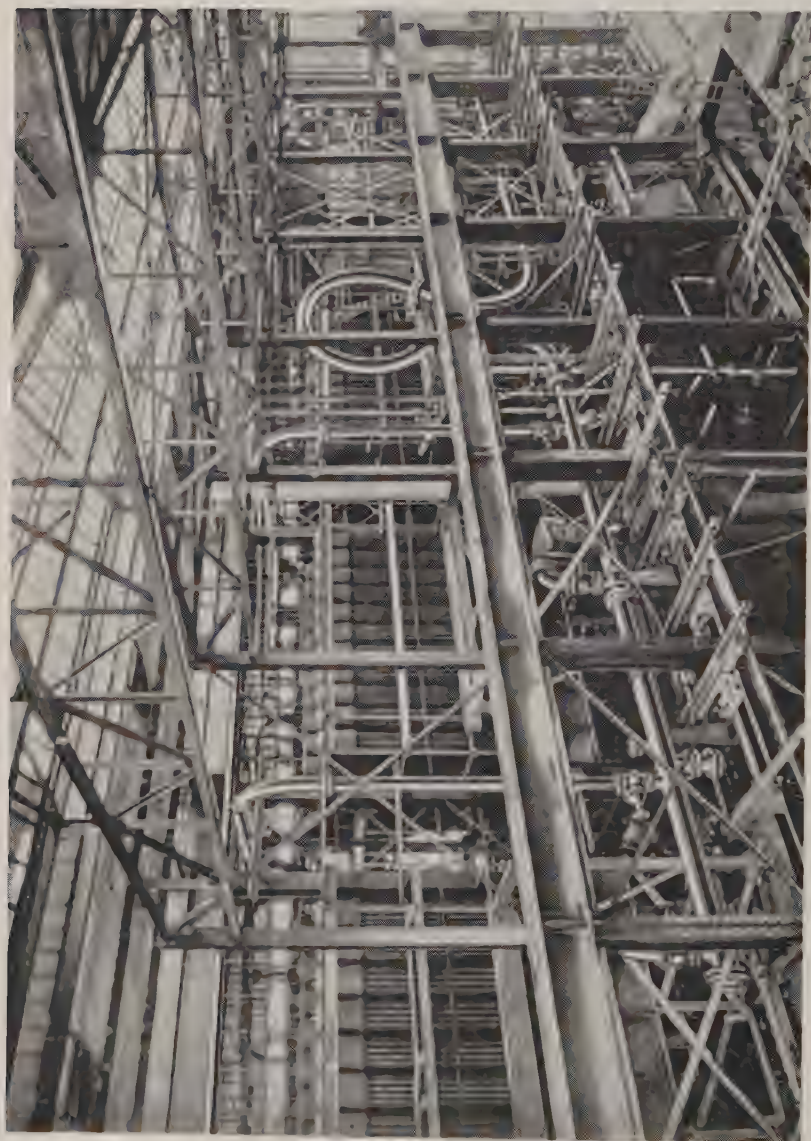
**REPUBLIC RAILWAY & LIGHT
COMPANY**
Lowellville, Ohio
Designed by Republic Engineers, Inc.



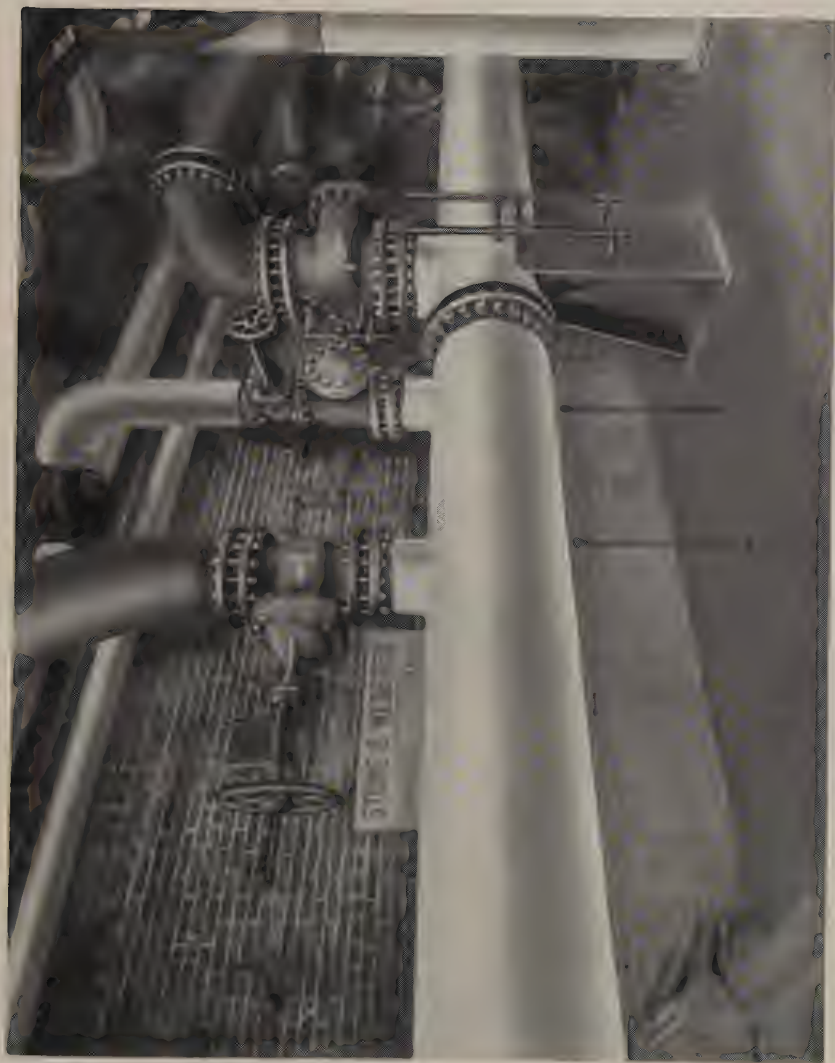
Steam Piping showing Expansion Loop, and Main Steam Piping, in
Colfax Power Station of Duquesne Light Company at Cheswick, Pa.
Motor operated Gate Valves in the Foreground.
Dwight P. Robinson Company, Engineers



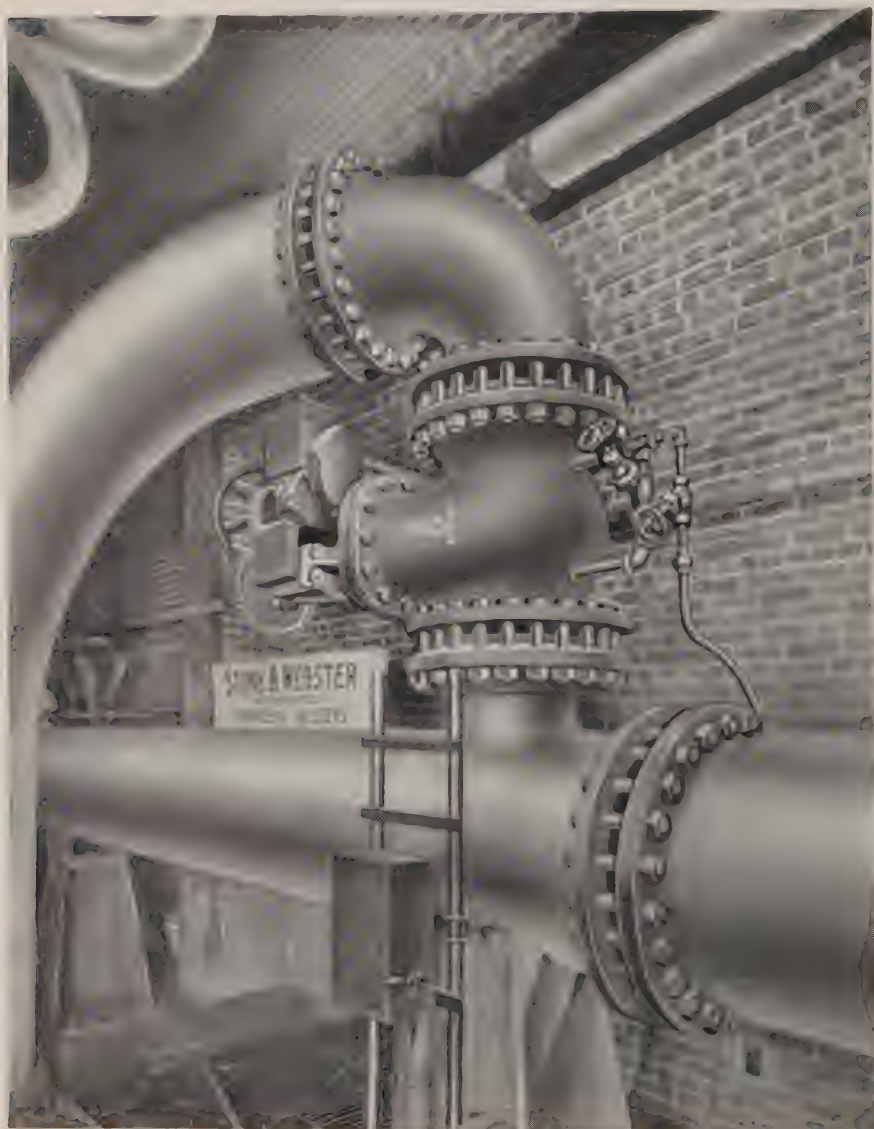
**Steam Piping in Boiler Room of Colfax Power Station of Duquesne Light
Company at Cheswick, Pa.**
Dwight P. Robinson Co., Engineers.



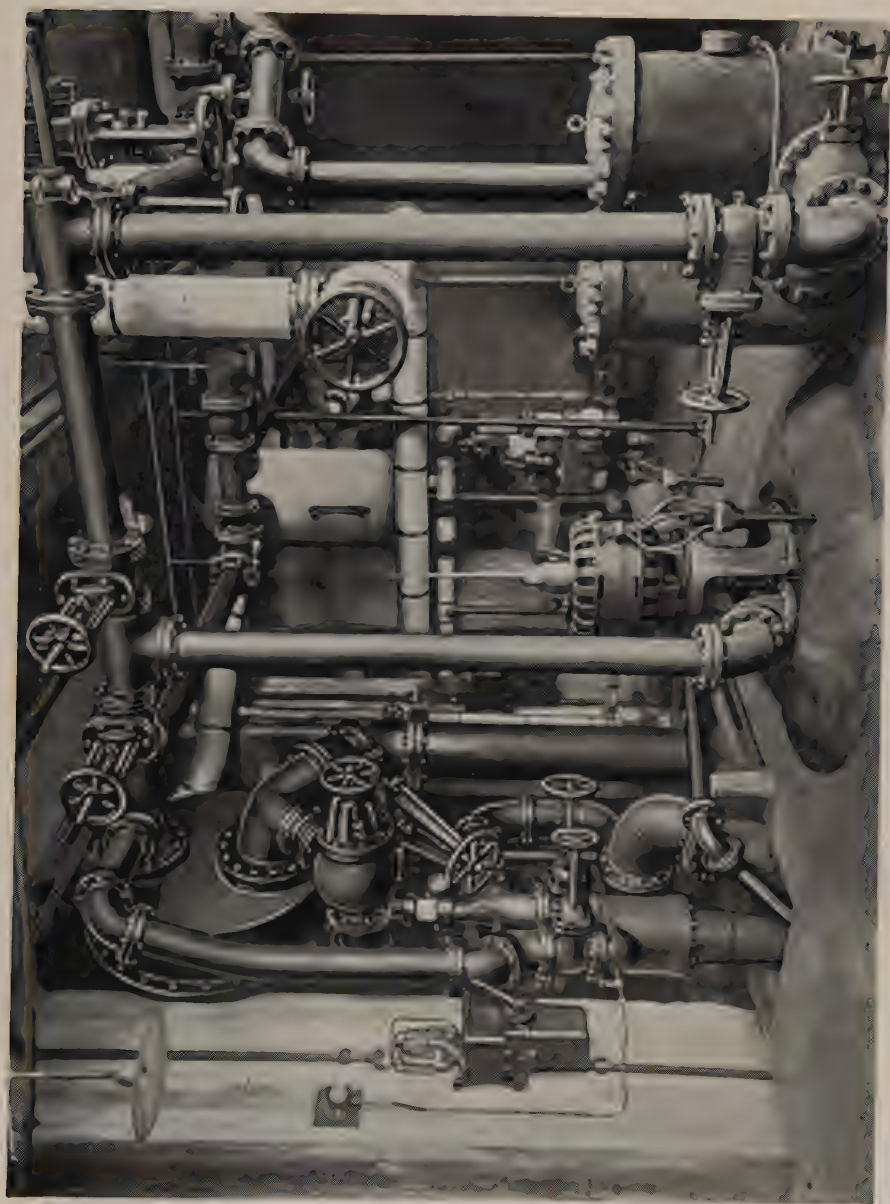
Steam Piping at the South Meadow Power Station of The Hartford Electric Light Co., Hartford, Conn.
Stone & Webster, Inc., Engineers.



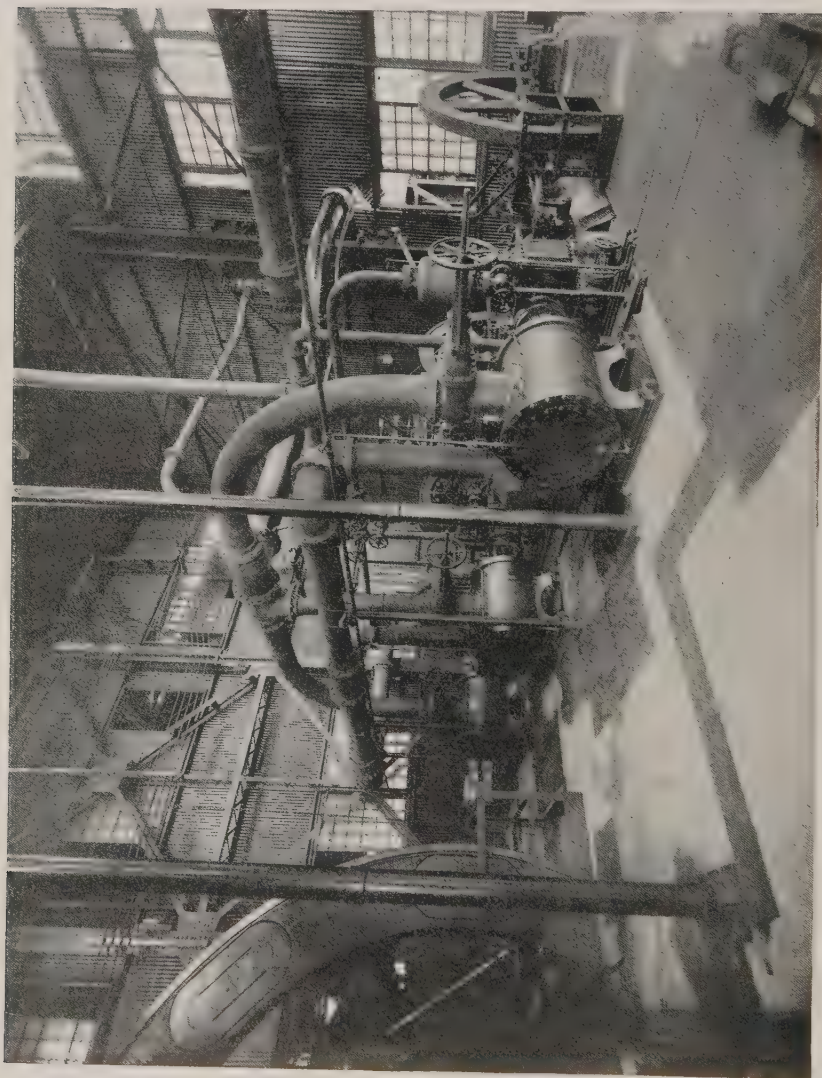
Part of Main Steam Header of South Meadow Power Station,
Hartford Electric Light Company, Hartford, Conn.
Stone & Webster, Inc., Engineers.



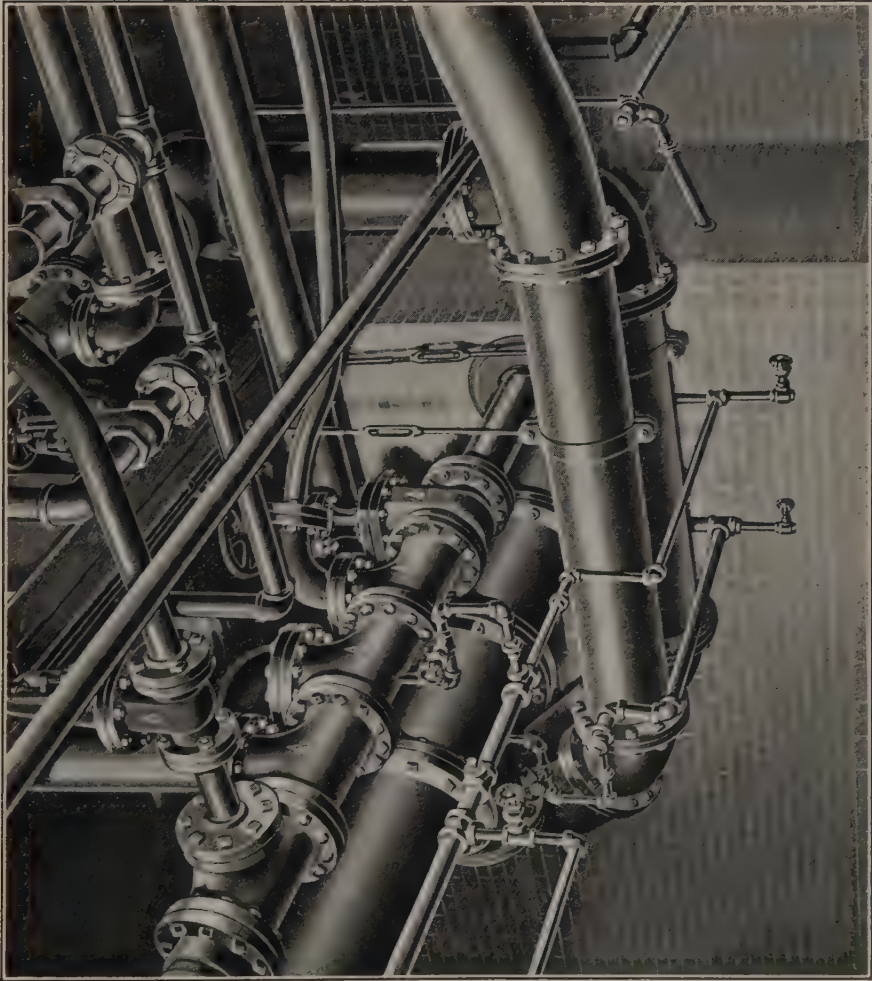
Part of Main Steam Header of South Meadow Power Station,
Hartford Electric Light Co., Hartford, Conn.
Stone & Webster, Inc., Engineers.



Miscellaneous Piping at the Cleveland Power Plant of the Penna. Lines West of Pittsburgh

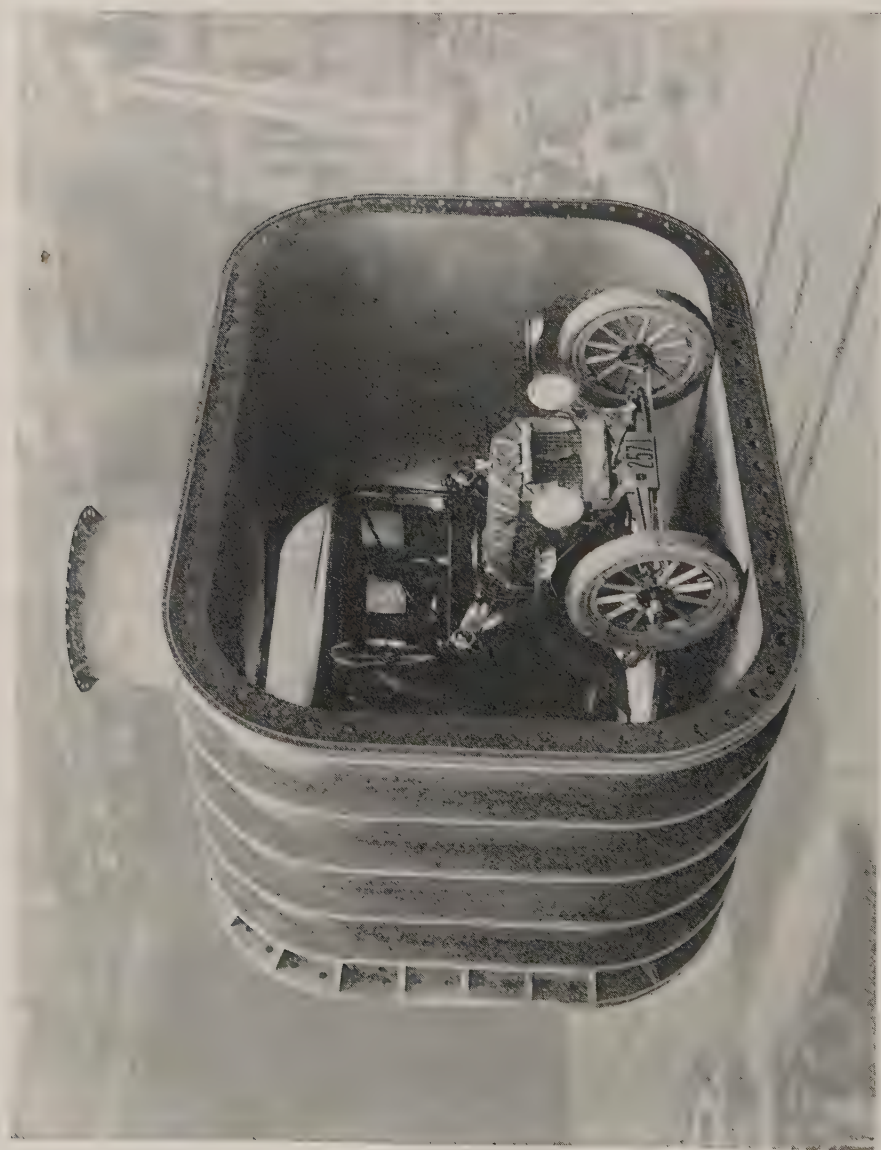


Plant of Pittsburgh Steel Co., Monessen, Pa.

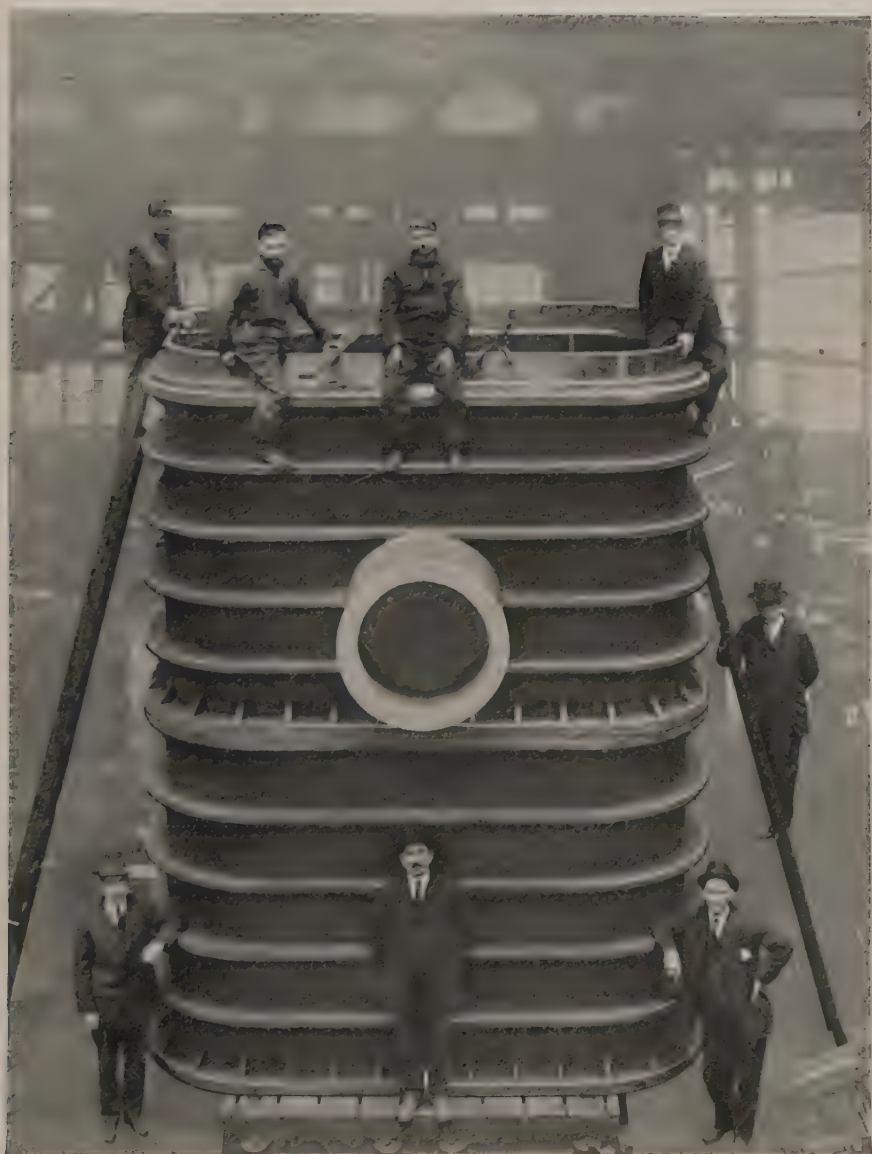


Miscellaneous Piping in Bridgeport Plant of Remington Arms and Ammunition Co.

Stora & Webster Engineering Corp. Engineers



10'-9" x 7'-6" Exhaust Connection Between 17,000 K. W. Turbine and Condenser
Made for Jones & Laughlin Steel Co., Pittsburgh, Pa.



10'-9" x 7'-6" Exhaust Connection between 17,000 K. W. Turbine and
Condenser. Made for Jones & Laughlin Steel Company,
Pittsburgh, Pa.



60 x 42 x 42 x 42 Inch Special Cross with 30-Inch Side Outlet

Used by Jones & Laughlin Steel Co. on Condenser Plant



82" Exhaust Casting between Turbine and Condenser, St. Joseph Lead Company, River Mines, Mo.

THE AMERICAN STANDARD
FOR
PIPE FLANGES, FITTINGS AND
THEIR BOLTING

We have adopted the American Standard as recommended by the American Society of Mechanical Engineers effective January 1, 1914, and revised March 7 and 20, 1914.

Unless otherwise ordered, all material for pressures up to and including 250 pounds working steam pressure will be furnished in accordance with this standard.

EXPLANATORY NOTES

(a) Standard and Extra Heavy Reducing Elbows carry same dimensions center to face as regular Elbows of largest straight size.

(b) Standard and Extra Heavy Tees, Crosses and Laterals, reducing on run only, carry same dimensions face to face as largest straight size.

(c) If Flanged Fittings for lower working pressure than 125 pounds are made, they shall conform in all dimensions, except thickness of shell, to this standard and shall have the guaranteed working pressure cast on each fitting. Flanges for these fittings must be of standard dimensions.

(d) Where long radius fittings are specified, it has reference only to Elbows which are made in two center to face dimensions and to be known as Elbows and Long Radius Elbows, the latter being used only when so specified.

(e) All standard weight fittings must be guaranteed for 125 pounds working pressure and extra heavy fittings for 250 pounds working pressure, and each fitting must have some mark cast on it indicating the maker and guaranteed working steam pressure.

(f) All extra heavy fittings and flanges to have a raised surface of $\frac{1}{16}$ inch high inside of bolt holes for gaskets.

Standard weight fittings and flanges to be plain faced.

Bolt holes to be $\frac{1}{8}$ inch larger in diameter than bolts, except for bolts $1\frac{3}{4}$ inch and larger, when holes should be $\frac{1}{4}$ inch larger than bolts.

Bolt holes to straddle center line.

(g) Size of all fittings scheduled indicates inside diameter of ports.

(h) The face to face dimensions of reducers, either straight or eccentric, for all pressures, shall be the same face to face as given in table of dimensions.

(i) Square head bolts with hexagonal nuts are recommended.

For bolts, $1\frac{5}{8}$ -inch diameter and larger, studs with a nut on each end are satisfactory

Hexagonal nuts for pipe sizes 1 inch to 46 inches, on 125-pound standard, and 1 inch to 16 inches, on 250-pound standard, can be conveniently pulled up with open wrenches of minimum design of heads. Hexagonal nuts for pipe sizes 48 inches to 100 inches on 125-pound and 18 inches to 48 inches on 250-pound standards, can be conveniently pulled up with box or socket wrenches.

(j) Twin Elbows, whether straight or reducing, carry same dimensions center to face and face to face as regular straight size ells and tees.

Side Outlet Elbows and Side Outlet Tees, whether straight or reducing sizes, carry same dimensions center to face and face to face as regular tees having same reductions.

Angle Elbows and Special Angle Fittings, from 1° to 45° , use center to face dimensions given for regular 45° elbows, and over 45° , use center to face dimensions given for regular 90° elbows.

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(k) Bull Head Tees or Tees increasing on outlet, will have same center to face and face to face dimensions as a straight fitting of the size of the outlet.

(l) Tees and Crosses 16 inches and down, reducing on the outlet, use the same dimensions as straight sizes of the larger port.

Size 18 inches and up, reducing on the outlet are made in two lengths depending on the size of the outlet as given in the table of dimensions.

(m) Laterals 16 inches and down, reducing on the branch, use the same dimensions as straight sizes of the larger port.

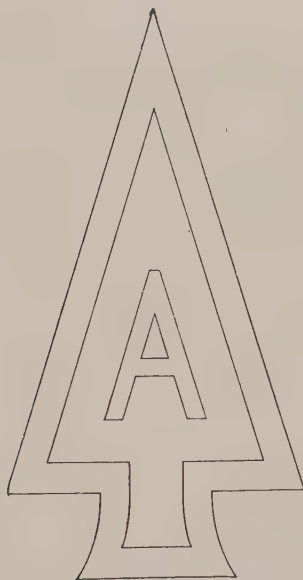
Sizes 18 inches and up, reducing on the branch, are made in two lengths depending on the size of the branch as given in the table of dimensions.

The dimensions of reducing flanged fittings are always regulated by the reductions of the outlet or branch. Fittings reducing on the run only, the long body patterns will always be used.

Y's are special and are made to suit conditions.

Double Sweep Tees are not made reducing on the run.

(n) Steel Flanges, Fittings and Valves are recommended for superheated steam.



ATWOOD

**STANDARD SPECIFICATIONS
FOR
POWER PIPING***

**Adopted by the Power Piping Society June 24, 1915
Revised January 27, 1922**

GENERAL REQUIREMENTS

In the absence of a distinct specification by the Purchaser for material of a different grade, all material furnished shall conform to these specifications.

MATERIALS

Castings—All castings shall be smooth and free from injurious defects.

Cast Steel—The metal in steel castings shall conform to the requirements of the American Society for Testing Materials for "Medium Castings."

Semi-Steel—The metal in semi-steel castings shall have a tensile strength of not less than 30,000 pounds per square inch. A transverse test of the "Arbitration Bar" as outlined by the American Society for Testing Materials, supported 12 inches between centers shall show before breaking a load of 3,300 pounds and a deflection of not less than .12 inch.

Gray Iron—The metal in gray iron castings shall have a tensile strength of not less than 20,000 pounds per square inch. A Transverse test as for semi-steel shall show before breaking a load of 2,900 pounds and a deflection of .10 inch.

DIMENSIONS OF FLANGED FITTINGS

All standard and extra heavy flanged fittings shall conform to the center to face, thickness, and flange dimensions of the "American Standard" as recommended in 1914 by the A. S. M. E. Fittings used for working steam pressures 25 pounds and lower, and for water pressures 50 pounds and lower, may be lighter in the shell than the American Standard for 125 pounds working pressure.

DRILLING AND FACING OF FLANGES

All drilling of flanges shall conform to the templates of the said "American Standard" and shall straddle centers.

Standard flanges shall be plain faced. Extra heavy flanges shall have raised face extending to the inside edge of bolt holes.

SPOTFACING AND BACKFACING

All bolt holes in the flanges of cast steel material; extra heavy cast iron or semi-steel material, 14 inch and larger; and standard material 24 inch and larger, shall be spotfaced. Backfacing of flanges shall be considered the equivalent of spotfacing.

* The form of piping specification here printed is that recommended by the Power Piping Society for a safe economical commercial installation, and is given as a guide in framing actual specifications. The pressures specified are somewhat under those at which satisfactory service can be expected under favorable conditions but are as high as good practice will permit.

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TYPE OF JOINTS

The following sizes are the smallest for which flanged joints will be required except for unions. Below these sizes screwed connections may be used.

Superheated steam.....	2 inch
Saturated steam above 125 pounds.....	2½ inch
Boiler Feed.....	2½ inch
Exhaust.....	2½ inch
Low Pressure Water.....	2½ inch
Blow-off.....	2 inch
Drains.....	2½ inch

GATE, GLOBE AND ANGLE VALVES

Gate valves shall be used except where their function is that of throttling; or for sizes smaller than 1½ inch for superheated steam, or ¾ inch for saturated steam, in which case they shall be either globe or angle valves.

All outside screw gate valves shall be backseated to provide for repacking under pressure.

Materials and test pressures for the various services shall be as follows:

Superheated Steam—Gate valves 2 inch and larger shall be extra heavy, outside screw and yoke pattern, with cast steel bodies, bonnets, discs and yokes; monel metal or 23 per cent nickel steel seats and disc rings; monel metal or 23 per cent nickel steel stems; and monel metal or 23 per cent nickel steel backseating bushings below the stuffing boxes. Valves 8 inch and larger shall be by-passed.

Globe and angle valves 2 inch and larger shall conform to the same general specification.

All valves 1½ inch and smaller shall be extra heavy and shall be made of bronze containing not less than 10 per cent of nickel, cast steel monel mounted or drop forged steel monel mounted.

Valves shall be tested to 800 pounds hydrostatic pressure.

Saturated Steam Between 150 Pounds and 250 Pounds Per Square Inch Inclusive—Gate valves 2½ inch and larger shall be extra heavy outside screw and yoke pattern, with semi-steel bodies, bonnets, discs and yokes; bronze seats and disc rings; and bronze stems. Gate valves 8 inch and larger shall be by-passed.

Globe and angle valves 2½ inch and larger shall conform to the same general specification.

All valves 2 inch and smaller shall be extra heavy bronze.

Valves shall be tested to 800 pounds hydrostatic pressure.

Saturated Steam Between 125 Pounds and 149 Pounds Per Square Inch Inclusive—Gate valves 2½ inch and larger shall be medium, outside screw and yoke pattern, tested to 500 pounds hydrostatic pressure, with gray iron bodies, bonnets, discs and yokes; bronze seats and disc rings; and bronze stems.

Gate valves 10 inch and larger shall be by-passed.

Globe and angle valves 2½ inch and larger shall be extra heavy pattern, tested to 800 pounds hydrostatic pressure, but otherwise to the same general specification.

All valves 2 inch and smaller shall be extra heavy bronze, tested to 500 pounds hydrostatic pressure.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Boiler Feed Between 125 Pounds and 250 Pounds Per Square Inch Inclusive—Gate valves 2½ inch and larger shall be extra heavy, outside screw and yoke pattern, with semi-steel bodies, bonnets, discs and yokes; bronze seats and disc rings; and bronze stems.

Globe and angle valves 2½ inch and larger shall conform to the same general specification.

Check valves 2½ inch and larger shall be extra heavy pattern, with bronze seats and disc rings.

All valves 2 inch and smaller shall be extra heavy bronze.

Valves shall be tested to 800 pounds hydrostatic pressure.

Exhaust—Gate valves 14 inch and larger shall be outside screw and yoke, low pressure pattern, suitable for 25 pounds working steam pressure, with gray iron bodies, bonnets, discs and yokes; bronze seats and disc rings; and rolled steel stems. Where space does not permit using outside screw and yoke, inside screw patterns may be used.

Gate valves 2½ inch to 12 inch inclusive shall be standard pattern, outside screw and yoke, suitable for 125 pounds working pressure, with gray iron bodies, bonnets, discs and yokes; bronze seats and disc rings; and rolled steel stems.

Gate valves 2 inch and smaller shall be standard brass.

Suction and Low Pressure Water—Gate valves shall conform to the same specification as for "Exhaust" except that in every case bronze stems shall be used.

Check valves shall be standard pattern swing checks with bronze seats and disc rings.

Drains Between 125 Pounds and 250 Pounds Per Square Inch—Valves shall conform to the specification for those for "Saturated Steam between 150 and 250 pounds per square inch inclusive," except for superheated steam when valves next to the pipes drained shall conform to the specification for those for "Superheated Steam."

Low Pressure Drains—Valves shall conform to the specification for those for "Exhaust."

NON-RETURN VALVES

Non-return valves, either globe or angle type, shall be provided in each boiler connection. They shall work quietly, and shall automatically prevent the flow of steam from the lines to the boilers and shall be provided with means for closing by hand.

For superheated steam they shall be extra heavy, cast steel, completely monel mounted, with monel metal pistons and dash pots if same are internal, and monel metal stems.

For saturated steam up to 250 pounds per square inch they shall be semi-steel, completely bronze mounted, with bronze pistons and dash pots and bronze stems.

Non-return valves shall be installed preferably with stems in a vertical position.

BLOW-OFF VALVES

Each blow-off connection shall be provided with one cock and one blow-off valve.

FITTINGS

Superheated Steam—Fittings 2 inch and larger shall be extra heavy, cast steel. Fittings 1½ inch and smaller shall be forged or cast steel.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Saturated Steam, Boiler Feed and Drains Between 125 Pounds and 250 Pounds Per Square Inch Inclusive—Fittings 2½ inch and larger shall be extra heavy, semi-steel. Elbows for boiler feed shall be long radius where possible. Fittings 2 inch and smaller shall be extra heavy, gray iron.

Exhaust, Suction, Low Pressure Water and Low Pressure Drains—Fittings 14 inch and larger shall be low pressure, gray iron, suitable for 25 pounds working steam pressure. Fittings 12 inch and smaller shall be standard cast iron.

Flanged elbows for water shall be long radius where possible.

Blow-off—Fittings shall be extra heavy semi-steel. Long radius fittings shall be used where possible.

PIPE FLANGES AND UNIONS

Van Stone flanges shall fit the pipe closely. The lap shall be turned over and finished off to the inside edge of the bolt holes and faced with a fine tool finish.

Screwed flanges shall be made up by machine where possible and on all extra heavy flanges made up in the shop the pipe shall extend completely through the flange and shall be refaced after making up.

Superheated Steam—Flanges 4 inch and larger shall be extra heavy high hub steel, Van Stoned. Flanges 3½ inch and smaller shall be extra heavy steel, screwed.

Saturated Steam Between 150 Pounds and 250 Pounds Per Square Inch Inclusive—Flanges 4 inch and larger shall be extra heavy low hub steel, Van Stoned.

Flanges 3½ inch and smaller shall be extra heavy semi-steel, screwed.

Saturated Steam Between 125 Pounds and 149 Pounds Per Square Inch Inclusive—Flanges 7 inch and larger shall be extra heavy high hub semi-steel, Van Stoned.

Flanges 6 inch and smaller shall be extra heavy semi-steel, screwed.

Boiler Feed Piping Between 125 Pounds and 250 Pounds Per Square Inch Inclusive—Flanges shall be extra heavy steel, screwed.

Drain Piping Between 125 Pounds and 250 Pounds Per Square Inch Inclusive—Flanges shall be extra heavy semi-steel, screwed.

Exhaust, Suction, Low Pressure Water and Low Pressure Drains—Flanges 14 inch and larger shall be standard cast iron pattern, Van Stoned.

Flanges 12 inch and smaller shall be standard cast iron, screwed.

Blow-off—Flanges shall be extra heavy semi-steel, screwed.

Unions—On all screwed work a sufficient number of unions shall be used to facilitate repairs. One union shall be used near each screwed valve. Unions 1½ inch and larger shall be flanged and below 1½ inch they shall be gasketless, with non-corrosive seats.

WROUGHT PIPE

Wrought pipe shall be steel. Standard pipe shall be butt welded for sizes 3 inch and smaller and lap welded for sizes 3½ inch and larger. Extra strong pipe shall be butt welded for sizes 2 inch and smaller and lap welded for sizes 2½ inch and larger.

Steam Between 150 Pounds and 250 Pounds Per Square Inch Inclusive—Pipe shall be full weight 7 inch and smaller. Sizes larger than 7 inch shall be of the following thicknesses or weights per foot: 8 inch, 28.55 pounds; 9 inch, 33.90 pounds; 10 inch, 40.48 pounds; 12 inch, 49.56 pounds; 14 to 16 inch inclusive, ⅝ inch; 18 to 20 inch inclusive, ⅞ inch; 22 to 24 inch inclusive, ½ inch.

Steam Between 125 Pounds and 149 Pounds Per Square Inch Inclusive, Suction and Low Pressure Water—Pipe shall be full weight 7 inch and smaller. Sizes larger than 7 inch shall be of the following thicknesses or weights per foot: 8 inch, 24.69 pounds; 9 inch, 33.90 pounds; 10 inch, 34.24 pounds; 12 inch, 43.77 pounds; 14 inch to 20 inch inclusive, $\frac{5}{8}$ inch; 22 inch to 24 inch inclusive, $\frac{3}{8}$ inch.

Boiler Feed—Pipe for pressures between 150 and 250 pounds per square inch inclusive shall be extra strong and between 125 pounds and 149 pounds per square inch inclusive, shall conform to the specifications for "Steam" for the same pressures.

Exhaust Piping—Pipe 7 inch and smaller shall be full weight; 8 inch to 12 inch inclusive, shall be the same as for "Steam between 125 pounds and 149 pounds per square inch inclusive"; between 14 inch and 18 inch inclusive it shall be $\frac{1}{4}$ inch; and 20 inch and larger it shall be of the lightest card weight.

Blow-off—Pipe shall be extra strong.

Drains—Pipe shall be extra strong.

Welding—Where it is advisable economically, branches shall be welded to main piping, in preference to the use of fittings. All welds so made shall receive a hammer test under hydrostatic pressure three times the working pressure. The fillets on branches if butt welded shall be built up to a radius equal to not less than three times the thickness of the pipe wall.

Bends—Bends shall be used for changes of alignment in preference to fittings. They shall be substantially round in section and free from injurious buckles. Radii equal to not less than 6 diameters of the pipe shall be used where possible.

CAST IRON PIPE

Where used for exhaust, suction, and low pressure water, cast iron pipe shall correspond in thickness to "Class B" pipe as specified by the American Water Works Association.

BOLTS

All flange bolts $1\frac{1}{2}$ inches in diameter and smaller shall have square heads and U. S. Standard, hexagonal, cold punched, chamfered and trimmed nuts. For bolts larger than $1\frac{1}{2}$ inches studs with two nuts may be used. When pulled up the bolt thread shall extend completely through the nut.

GASKETS

Gaskets shall fit inside of bolt holes for all lines not under vacuum. Vacuum lines shall have full face gaskets.

Sheet gaskets up to and including 12 inch size shall be $\frac{1}{16}$ inch thick; and for 14 inch and larger they shall be $\frac{3}{32}$ inch thick.

Superheated Steam—Gaskets shall be superheat sheet or metal.

Saturated Steam, Boiler Feed, Blow-off and Drains—Gaskets shall be Rainbow or equivalent, or corrugated copper.

Exhaust—Gaskets shall be Rainbow or equivalent.

Suction and Low Pressure Water — Gaskets shall be cloth inserted rubber or equal.

SUPPORTS

A sufficient number of supports, preferably hangers, shall be provided and so placed that their working stresses shall have a factor of safety of not less than six, assuming that each hanger is bearing its proportion of the load with the line full of water.

Sufficient anchorage shall be provided where necessary.

If roller supports are used they shall have screw adjustments.

GATE VALVES

We manufacture two types of gate valves, namely, the parallel seat and the taper seat types. For exhaust, water, air and gas, we recommend the parallel seat type, while for medium and high pressure steam and hydraulic service, we recommend the taper seat type.

All types and sizes are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance where the valve is open or closed.

Our patterns are so arranged that valves can be made all iron or with bronze, monel or special mountings.

DEAN CONTROL ELECTRIC VALVE OPERATION

FOREWORD

Engineering developments in the steam, hydraulic and numerous other industrial fields have created a demand for a thoroughly reliable, flexible and efficient system for the motor operation and control of valves.

General Requirements

Experience has demonstrated that the requirements for the successful motor operation and control of valves are:

First—Reliability under all conditions of moisture, dampness, heat and cold to which valves are subject. Certainty of valve closing in an emergency.

Second—Adaptability to all sizes and types of valves.

Third—Flexibility, accommodating the system to the various methods of local and remote, manual and automatic control necessitated by modern practice.

The only successful and satisfactory conformity to these requirements is found in the Dean Control System. In addition this system of electrical valve operation affords the advantage of—

A—A safeguard to both lives and property.

B—An effective means for periodically testing valves to insure their operativeness.

C—A substantial saving of time, labor and operating expense.

The Dean Control is a standardized unit system of motor operation for valves of all sizes. The electric motor, reduction gearing and adjustable limit switch are completely housed in a water-tight cast iron casing, the whole comprising a single compact unit. These units are built in a series of types embracing the complete range of valve sizes.

Dean Control Units are equipped with totally enclosed, water-proof, high torque, ball bearing motors. A specially designed speed reducing gear permits the motor to attain full speed before the driving power is applied to the valve stem thereby producing an effect which positively unseats the valve. The reduction from the motor speed to the relatively slow travel of the gate insures a wide reserve of power for closing the valve under various conditions of velocity and pressure.

The Dean Control Unit will not jam or break the valve parts. The limit switch mechanism automatically opens the power circuit and mechanically disengages the motor from the valve stem at both extremes of the gate travel.

The stop mechanism is very simply adjusted to accurately insure full opening and closing irrespective of friction due to working pressure and stiff operating valve parts.

The system is operated from one or more local or remote control stations by the mere turn of a controller handle (see Fig. 9040, page 32). These stations are equipped with red and green indicating lamps showing the position of the valve. The whole system is rugged—moisture, dust and fool-proof and guaranteed to function under the most severe conditions.

DEAN CONTROL ELECTRICAL SPECIFICATIONS

Voltage—The Dean Control System is manufactured for the following electrical circuits:

Direct current 110 and 220 volts.

Alternating current 220 volts only.

25 to 60 cycle single phase.

Dean Control—The Dean Unit consists of a motor driven water-tight and weather-proof mechanism including motor, electrical and mechanical limit and reduction gears in one casing. The pinion operating shaft only, projects from the casing (see Fig. 9039, below).

Main Casing—The main casing in which the gears, limit switch and motor are fitted is of heavy cast iron construction, accurately machined and totally enclosed. All surfaces are machined and fitted with suitable gaskets.

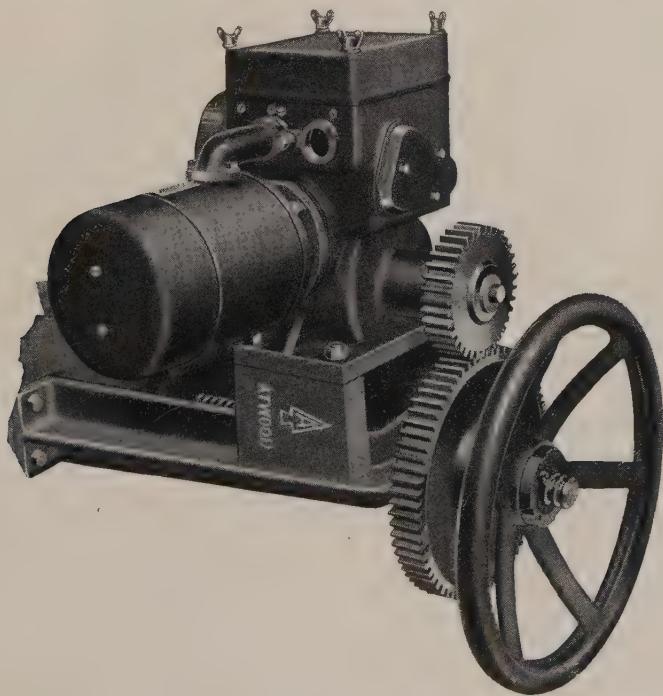


Fig. 9039
Dean Control Unit Mounted on Gate Valve

Gears—The reduction gears are of the combination worm and planetary spur type running completely immersed in oil. The worm shaft operates entirely in ball bearings, and is machine cut, ground, and highly polished. The worm wheel is of bronze, having large contact area. The worm and spur gears and all shafts are of heat treated steel accurately machined. The slow speed driving shaft operates in bronze bearings lubricated by a spring compression grease cup. The limit trip gears are of hardened steel operating in an oil-tight case.

Limit Stop Mechanism—The limit mechanism is built under the Dean patents, and effects quick stoppage of the valve stem at the end of travel. A mechanical clutch automatically disconnects the high speed momentum carrying parts from the valve stem and at the same moment the electrical circuit is opened by the limit switch.

This is of extreme importance, and by its use the valve gate may be closed to a fixed predetermined point at every operation. It entirely eliminates drift, or overtravel. The mechanism also contains an internal lost motion device enabling the motor to reach full speed before it is clutched to the valve stem. All limit switch contacts are of sufficient capacity to **break the main line motor current** without arcing and are silver-plated, which always insures contact.



Fig. 9040
Dean Control Station

See Page 33

Motors—Alternating Current—The alternating current Dean motors are of the single phase, series wound, high torque, commutator type with distributed field winding.

Direct Current—Direct current motors are of the high torque, series wound, four pole type with four brushes.

Direct and alternating current motors are interchangeable on the same unit.

All motors are totally enclosed, steam-proof, moisture-proof, water-proof, and provided with winding of such characteristics as to particularly suit valve operation. The speed automatically slows down when seating, thus affording protection to the seat and gate rings to prevent cutting.

Rating—All motors are rated to give full running torques for **fifteen minute** operation without undue temperature rise.

Conduit Entrance—The Dean Unit is provided with one standard size conduit hole for the entrance of all outside cables, and the cables between motor and limit housing are enclosed in cast iron water-tight shell.

Control Stations—Single Point Control—Control of the valve from one point is effected through a **double pole** reversing control station carrying the **main line current** (see Fig. 9040, page 32).

Multi-point Control—Control of the valve from two or more points is accomplished through a similar switch operating the relay circuit of a main line contactor panel. Complete **double pole break** is effected, thus preventing any possibility of operation due to "grounds."

The multi-point control stations are provided with "no voltage" release causing the switch drum to automatically return to the "off" position when the valve has completed its travel.

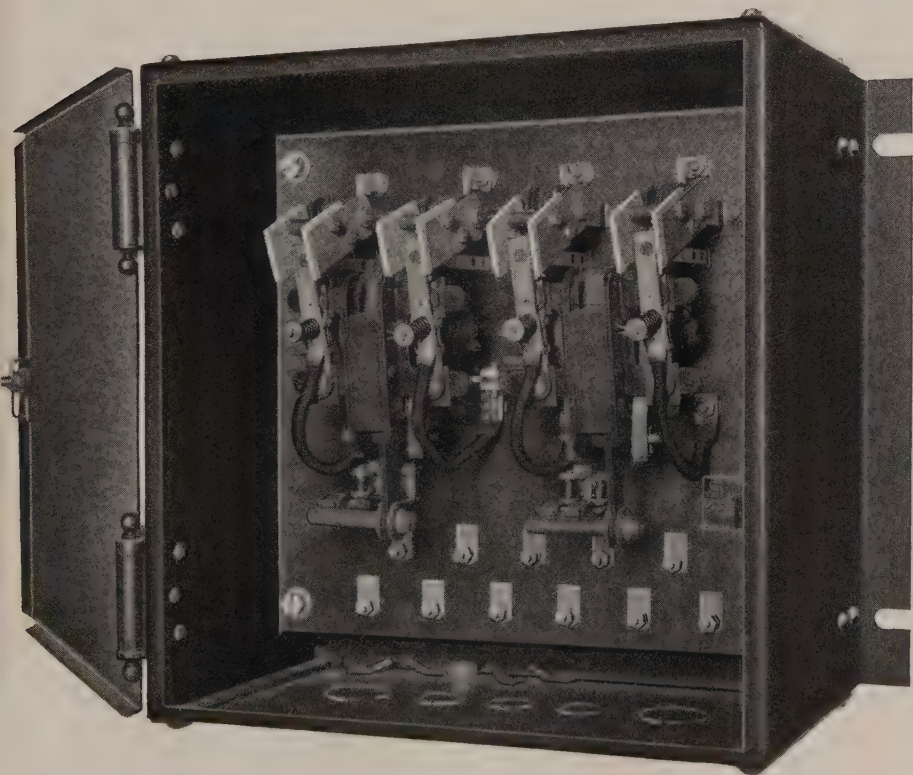


Fig. 9041
Relay Panel for Dean Control
See Page 34

All control stations consist of heavy contact switch drums fitted into a cast iron dust-proof casing with projecting handle and red and green indicating lights.

The stations are provided with Yale barrel lock, and two keys, together with glass window for emergency operation.

Light Indication—The position of the valve gate is shown by a single "open" or "closed" light glowing continuously. During travel both red and green lights glow, one light disappearing as the limit is reached. It is possible for both lights to appear only after the valve has actually moved, so giving positive indication of its operation.

Relay Panels—For multi-point control only, a Cutler-Hammer totally enclosed and dust-proof relay panel is provided, consisting of main line double pole reversing contactors, mechanically and electrically interlocked to prevent short circuit. The contactors are mounted on slate and enclosed in heavy sheet iron case with spring catch (see Fig. 9041, page 33).

These panels can be supplied in water-tight cast iron cases for outdoor operation when so specified.

Outdoor Operation—The standard Dean Control Unit is suitable for outdoor operation without further protection against the weather, but this service must be specified when ordering.

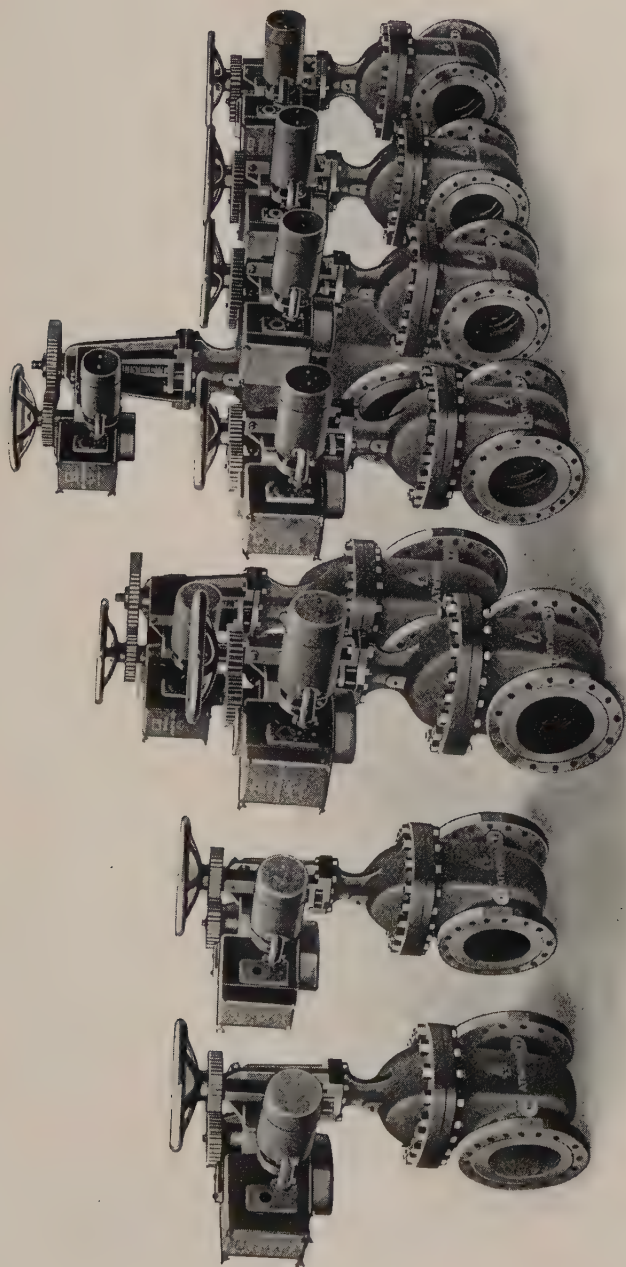
Hand Operation—When the unit is at rest the driving motor and gears are entirely disconnected from the valve stem, so that hand operation may be resorted to without releasing any cams or other mechanism. When power is applied the motor is automatically clutched to the valve stem, and is again released upon the tripping of the limit switch.

Floor Stands—The Dean Control Floor Stands can be furnished when required. This floor stand consists of a cast iron casing with a control station and relay panel when desired, together with the bevel gear reduction and hand wheel.

Valve Position Indicators—The Dean Control Indicators show the accurate position of the valve opening at remote points. These indicators consist of a 7-inch diameter dial calibrated in per cent of opening, or in inches and can be mounted on the switchboard and electrically connected to the valve.



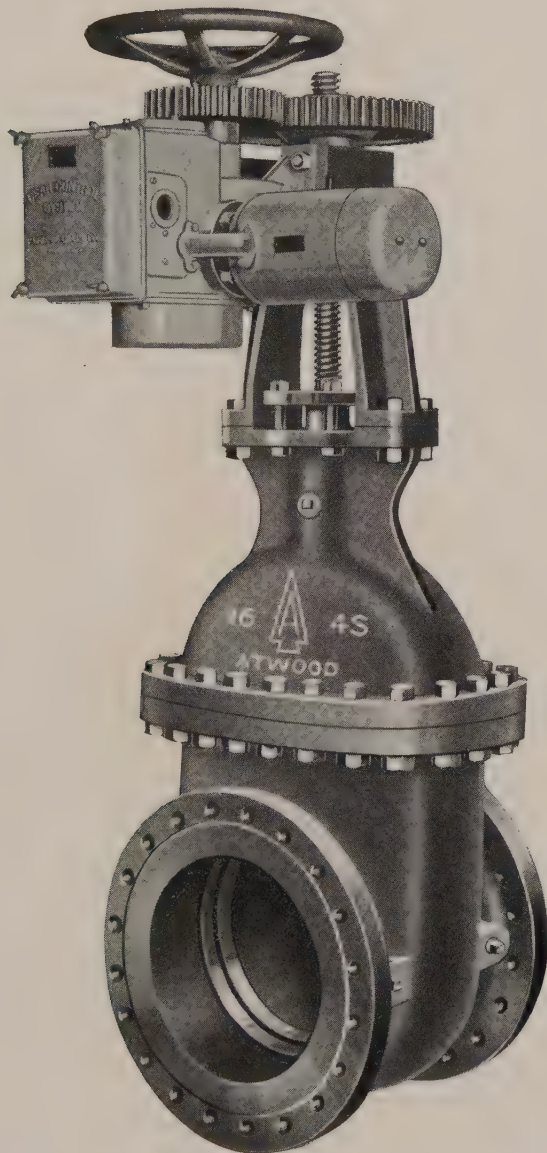
ATWOOD



Group of Motor Operated Cast Steel Gate Valves for Superheated Steam Service, Furnished for The Colfax Power Station of the Duquesne Light Co. These Valves Are Equipped with the Dean Control



24-Inch Low Pressure Gate Valve Motor Operated.
Equipped with Dean Control



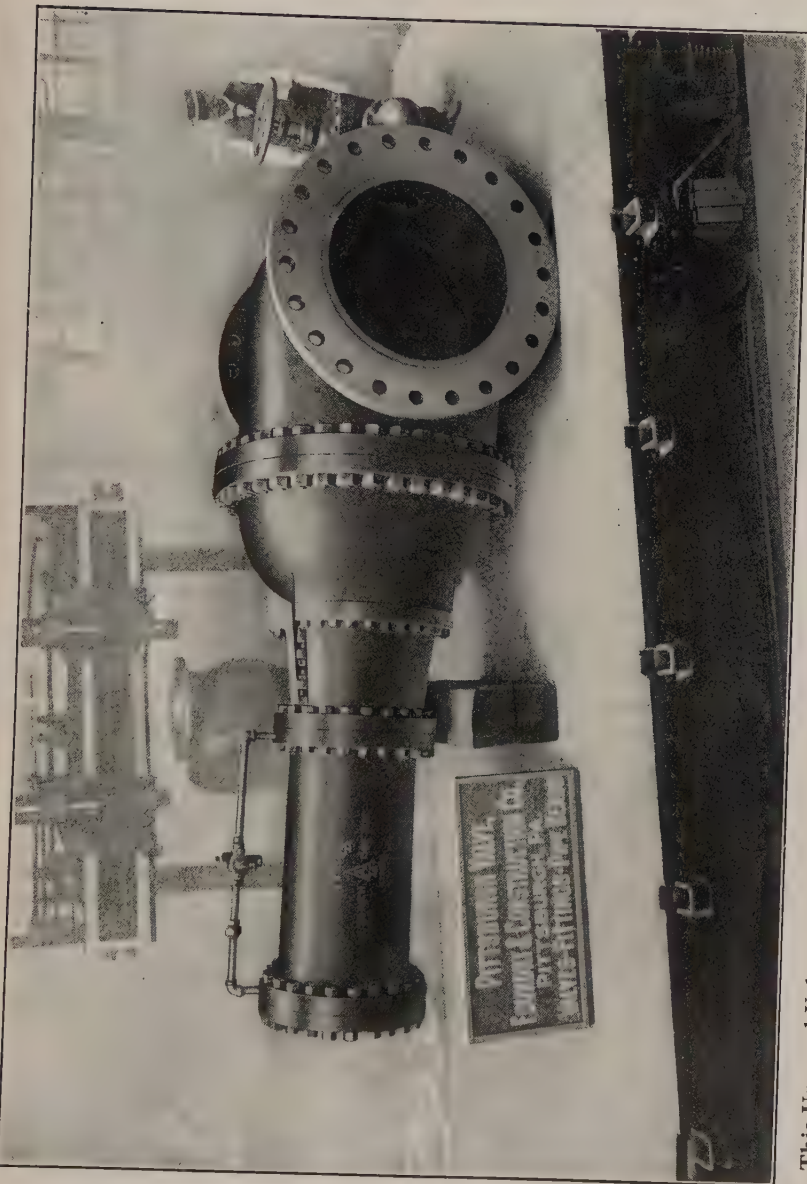
16-Inch Cast Steel Gate Valve for Superheated Steam Service. This Valve Is Equipped with Dean Control for Motor Operation

CYLINDER OPERATED GATE VALVES

We build cylinder operated gate valves for any pressure or service. The motive fluid may be water, air or steam. The following illustrations show a few special applications covering a wide range.

If the fluid is gaseous, as steam or air, we recommend placing the cylinder in a horizontal position. If, however, a vertical position can not be avoided we are prepared to furnish special attachments to meet conditions.

When writing for prices please give full data as to service and pressure of gate valve proper, also operating pressure in cylinder.



This Unusual Valve was One of an Order for 36-inch and 30-inch Sizes Built for Sanderson & Porter, Engineers, New York, and was Used by the Union Construction Co., San Francisco, Cal.

The operating head is 1500 ft. and the test was 1500 pounds hydrostatic pressure. The castings are steel throughout and the design followed our well known parallel seat type. All surfaces are either cylindrical or segments of spheres. Some idea of the care required to insure the success of these valves can be had when it is considered that the joint between the body and bonnet was under a total strain of nearly three million pounds on test and the whole was passed as absolutely tight. Slipping weight, 18 tons.



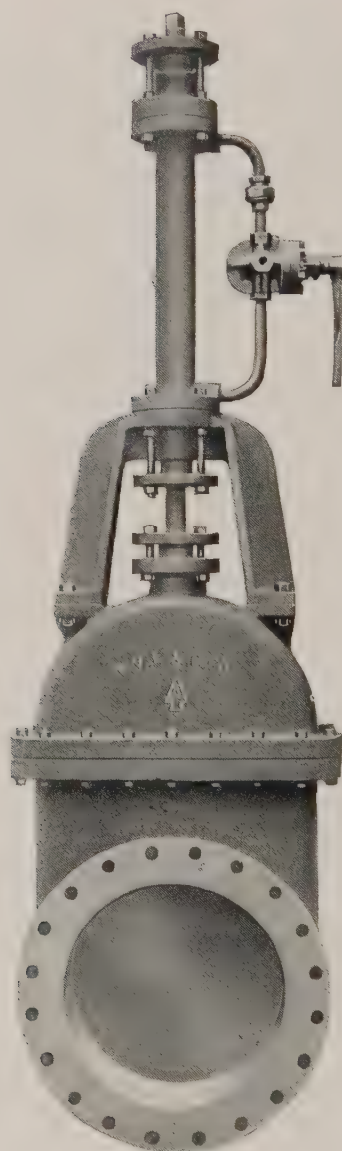
The Above Valve was One of a Large Shipment of Blast Gates Made for
the Lackawanna Steel Company, in 1904

We have since furnished the same type to numerous steel companies, mainly for blowing engine piping, and to power houses for the control of exhaust to condensers. The motive power may be air or steam. The stroke is cushioned at each end by a special arrangement of ports. This valve should be placed horizontally if actuated by steam or air. See page 38 for valve to work vertically.



**72" Hydraulically Operated Gate Valve with Special Indicating Device, at
Colfax Power Station of The Duquesne Light Company**

Dwight P. Robinson Company, Engineers.



The Above Illustrates a Large Low Pressure Water Valve, Controlled by a Cylinder Actuated by Water at 2200 Pounds

JOINTS FOR FLANGED WROUGHT PIPE

We are prepared to furnish wrought pipe with flanges attached by any of the methods approved by the best practice. The illustrations of the various types, together with a word of explanation may help the designer or purchaser in forming conclusions as to which will be the best adapted to his particular needs. Our data and experience are at the service of any who may find them useful.

"Inside Diameter" ("I. D.") pipe is used for all work 12 inches and smaller, unless otherwise ordered. "Outside Diameter" ("O. D.") pipe is used for work 14 inches and larger.

THE SCREWED JOINT

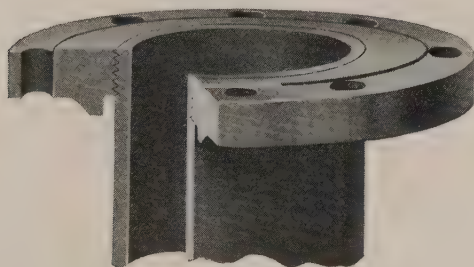


Fig. 9042

If properly made the screwed joint can be compared favorably with any other type for sizes up to and including 12 inches. Though we are prepared to thread pipe of larger sizes if desired, we do not recommend doing so because there exists an unavoidable variation both in size and contour in the larger diameters of wrought pipe which, though slight, is enough to make other joints preferable to the screwed joint for these sizes.

Careful workmanship and good tools are the main requisites for the production of a perfect screwed joint. Taps and dies must be in good condition and must correspond absolutely in taper, and the flange should be made up on the pipe in a machine. We pay especial attention to the maintenance of our tool equipment, and careful supervision in the shop enables us to turn out a thoroughly satisfactory screwed joint.

Where the use of a metallic gasket is contemplated the pipe should always be ordered refaced.

THE SHRUNK JOINT

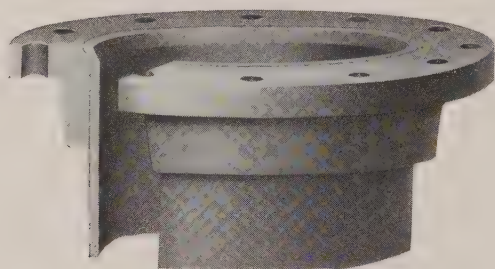


Fig. 902

This type of joint is made by shrinking the flange onto the pipe, and expanding the end of the pipe into a tapered counterbore, as shown. The flange may be riveted to the pipe, but we are not advocates of rivets as a means of securing flanges to a steam pipe. Each rivet is an added chance for leakage, while the only function it can perform is to resist a strain in the direction of the axis of the pipe, and the taper at the end of the pipe is sufficient to take care of all strains in this direction.

THE ATWOOD LAP

This admirable form of joint has stood the test of time, and is not surpassed if even equaled by any existing type. We have installed heavy special machinery for its production and have brought it to the standard of perfection demanded in high-class work. The face and bore of the flange are accurately made and the pipe is expanded and turned over on the end, and brought into close contact with the flange at every point. This is done hot so that there is no possibility of straining the metal of the pipe during the operation.

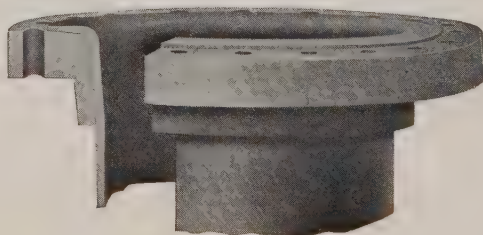


Fig. 904

Attention is called to the illustration which shows clearly the advantages of this joint as made by us.

If desired we can furnish the Atwood Lap with the square corner.

The lap extends completely to the bolt holes. This not only affords the greatest possible bearing for the gasket, but reduces the bending strains in the collar flange, caused by bolt tension, to the lowest possible figure.

The collar flange is bored taper—larger at the face than at the back. This greatly reduces the load carried by the “turnover”. In fact, should the turnover be entirely removed it would be impossible to blow the pipe out of the collar flange.

The principal advantages claimed for the Atwood Lap are:

1. The gasket bears on the pipe itself.
2. The loose collar flanges swivel on the pipe and facilitate erection.
3. The process of manufacture is a guarantee of the quality of the material used. Pipe that is not thoroughly welded in the lap will not stand the tension caused by turning over, but will split in the weld.

The turnover is given a light finish cut, insuring an absolutely true face for the gasket. Unless specially ordered, joints for low pressures will not be machined.

THE WELDED JOINT

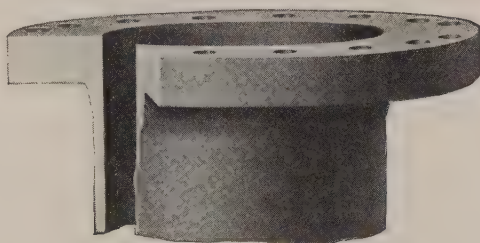


Fig. 906

This joint is made by welding a wrought steel flange to the end of the pipe, forming an integral piece of one homogeneous material. We are prepared to furnish these joints in all sizes.

THE EXPANDED JOINT

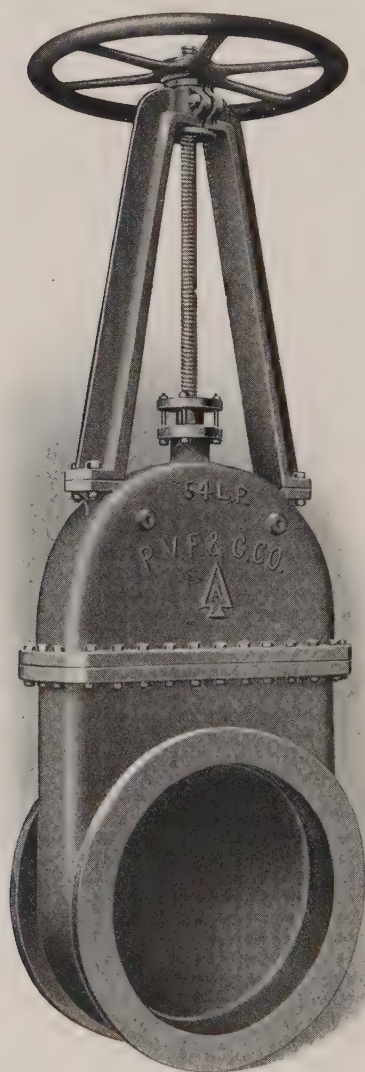


Fig. 907

On account of the fact that cast iron has little or no ductility we do not guarantee an Expanded Joint unless steel flanges are used.

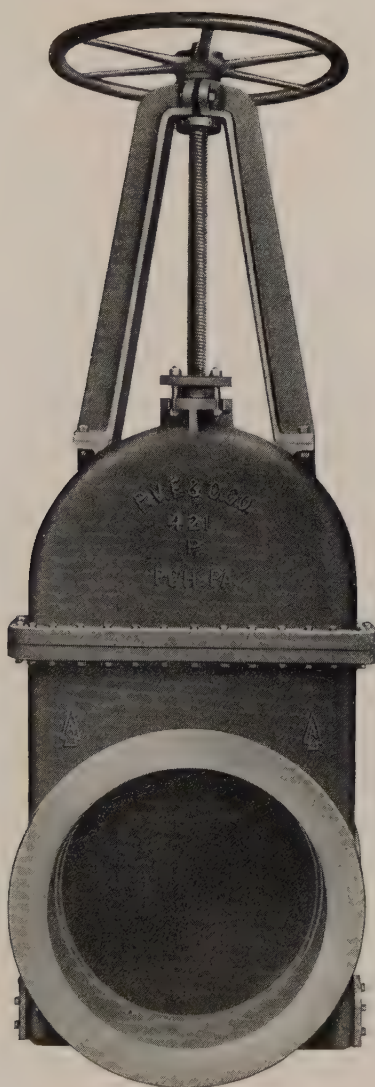
The pipe is expanded into the flange until the metal flows into the annular corrugations, and the outer end is then turned over into the taper counterbore.

GATE VALVES
LIGHT PRESSURE GAS SERVICE



We are prepared to furnish gate valves of any size, either inside screw or outside screw and yoke, especially adapted to this service.

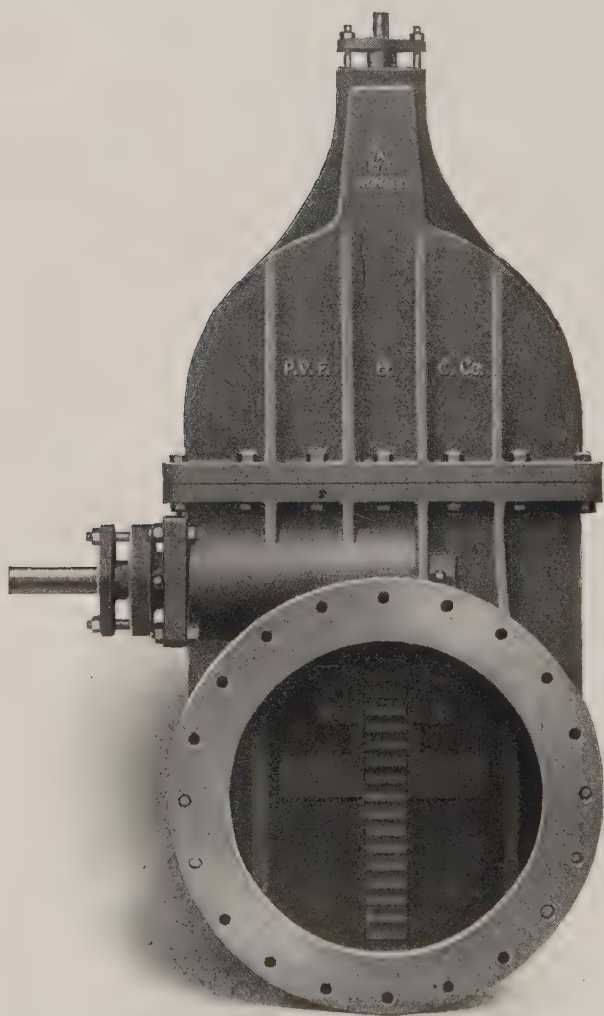
Prices will be quoted and dimensions furnished on receipt of specifications



42-inch Gate Valve for Light Gas Pressure Service

Made with square body and clean-out pockets. For coke oven gas plants and other service where cleaning out is necessary.

Prices on application



Low Pressure Single Disc Valve, Operated by Rack and Pinion.

Quotations made on receipt of information as to
pressure and service

**MATERIAL FOR EXHAUST AND LOW
PRESSURE STEAM AND
WATER LINES**

These valves and fittings are for working pressures up to 30 pounds.

When placing orders for material give pressure and service for which it is required.

Our templates for drilling, shown on page 383, correspond with the Low Pressure Standard for 50 pounds working pressure. All standard templates have bolt holes drilled in multiples of four straddling center lines.

This material will be furnished faced only unless otherwise ordered.

General dimensions of valves and fittings for this section will be found on pages 362 to 383, inclusive.

Face to face of reducing fittings is dependent upon the size of the branch, see page 404.

LOW PRESSURE GATE VALVES

No. 1 P

We recommend this type of valve for water, exhaust, air and gas, at 30 pounds pressure; they have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them. The discs are cast iron bronze mounted.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made all iron or with bronze mountings.

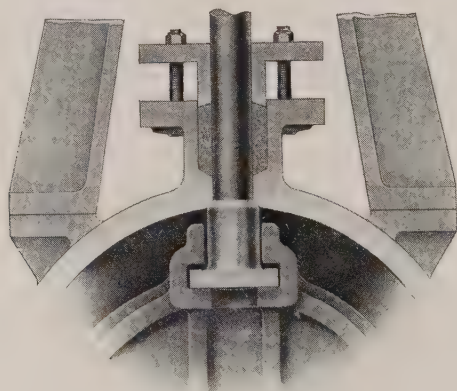


Fig. 206

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel when both are forced outward against their respective seats. For water valves the wedges are cast iron bronze mounted. This bronze mounting is cast into the iron in such a way as to make it impossible for it to become detached. It is thus seen that the wedging mechanism, being non-corrosive, cannot interlock and fail to open.

Valves 18 inches and above have the discs carried on bronze rollers working in bronze bushed bearings. These rollers are placed on both edges of the discs so that the valves can be installed with either disc to the pressure.

When gearing is necessary our standard types of bevel and spur gears can be made to fit almost any condition. (See pages 532 to 536.) If special conditions exist these types can be varied to suit.

We are prepared to furnish any desired special operating mechanism, such as cylinders for air, water or steam, or motor drives. (See pages 30 to 42.)

Outside screw and yoke valves are backseated for repacking, as shown in Fig. 206, page 50.

Unless otherwise ordered all valves are made to open by turning the wheel or nut to the left, viz., opposite to the motion of the hands of a clock.

When so ordered standard valves will be equipped with by-passes. By-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working Pressure.

Whether screw ends, flanged or hub ends.

Service—whether for steam, water, gas, etc.

Whether all iron or iron body bronze mounted.

Whether inside screw or outside screw and yoke.

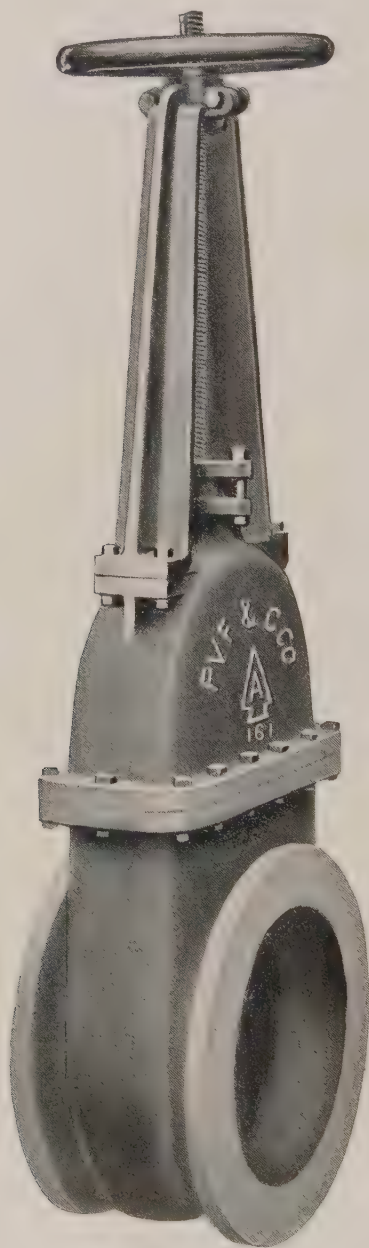
Whether gearing is required: if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.



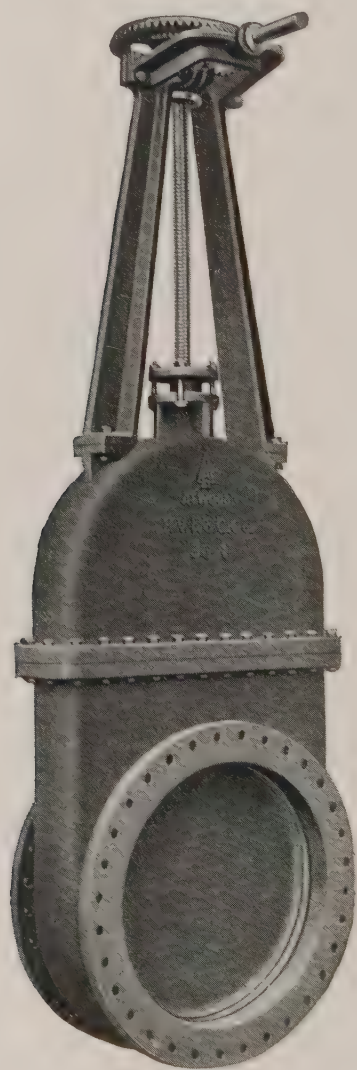
ATWOOD



O. S. & Y. Gate Valve for Low Pressure. Close Pattern
Price list page 56



72-inch Gate Valve. With Bevel Gear and Indicator



Flanged Gate Valve with Cross Arch Gearing for
Operating in Vertical Pipe

For additional prices of cross arch gearing see page 357.

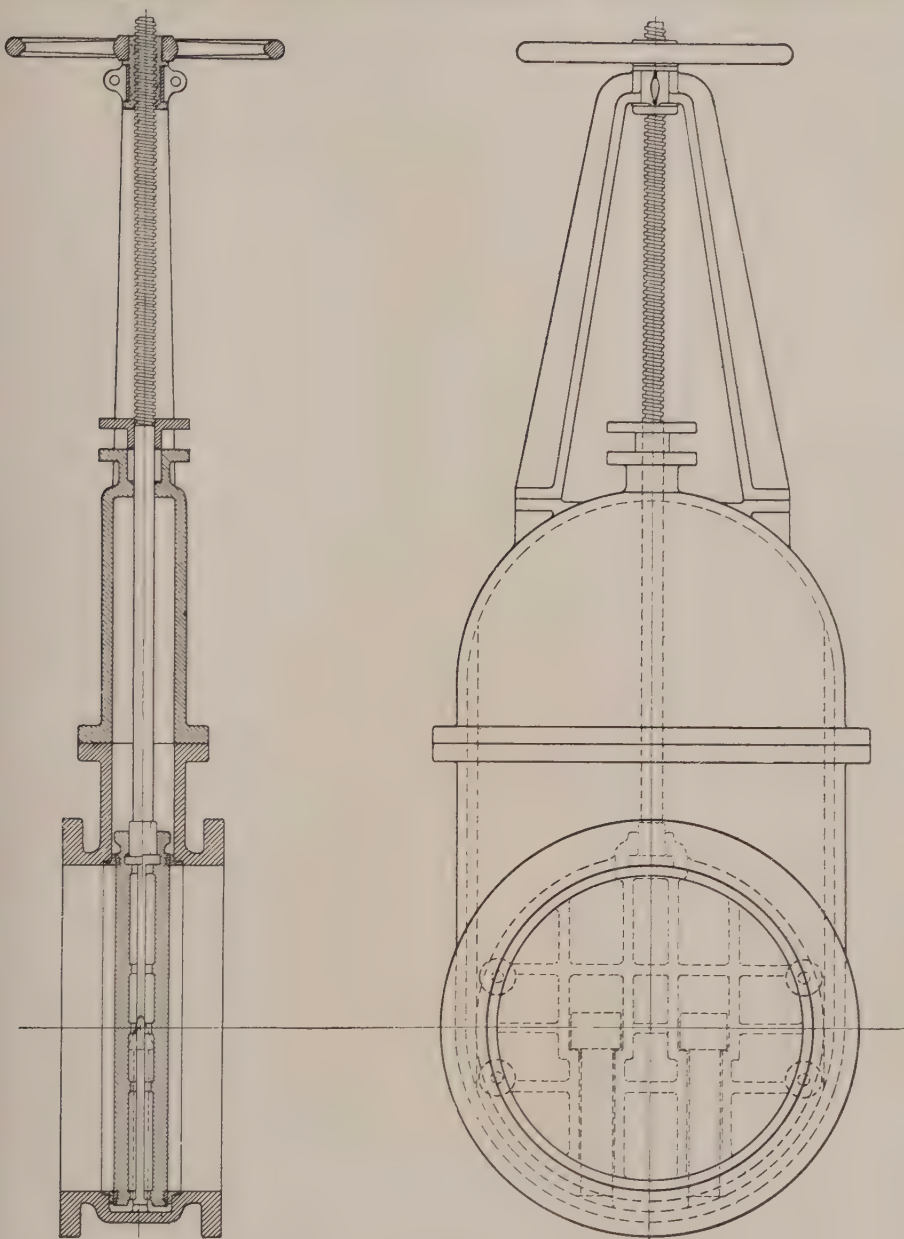


Fig. 97

**Close Pattern, Parallel Seat, Double Disc, Outside
Screw Valves for 30 pounds**

Especially adapted for exhaust and air lines

For prices see page 56.

For dimensions see pages 362 to 368.

FLANGED GATE VALVES No. 1 P

LOW PRESSURE

**IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.
FOR STEAM WORKING PRESSURES UP TO 30 POUNDS**

**FOR WATER WORKING PRESSURES
UP TO 50 POUNDS**

**The minimum opening through these
valves is 100 per cent of the
pipe area.**

Inside screw valve stems are made of bronze. Outside screw stems are made of steel, copper plated. Bronze stems will be furnished at an extra price.

These valves are suitable for pump suction and discharge, steam, air exhaust, gas lines, etc.

The discs are cast iron, bronze mounted.

All-iron valves will be furnished at a special price.



Inside Screw
Fig. 104



Outside Screw and Yoke
Fig. 105

PRICE LIST

Size Inches	Inside Screw Flanged Each	Outside Screw Flanged Each	Extra for Gears Each
14	\$ 165.00	\$ 200.00	.....
16	215.00	255.00	.....
18	300.00	340.00	.....
20	345.00	395.00	.....
22	475.00	535.00	.....
24	540.00	610.00	\$125.00
26	740.00	820.00	160.00
28	875.00	965.00	200.00
30	1025.00	1125.00	225.00
32	1125.00	1250.00	250.00
34	1200.00	1350.00	275.00
36	1450.00	1650.00	300.00
42	1900.00	2150.00	350.00
48	2800.00	3100.00	400.00
54	.....	.....	.....
60	.....	.....	.....
66	.....	.....	.....
72	.....	.....	.....

Extra for spotfacing and wooden protectors, see page 78. For drilling price list, see page 119. For drilling template, see page 383. For dimensions, see page 362. For description, see page 50.

For working and test pressures, see page 624.

HUB END GATE VALVES No. 1 P

LOW PRESSURE. INSIDE SCREW

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT

50 POUNDS WORKING WATER PRESSURE

The minimum opening through these valves is 100 per cent of the pipe area.



**Inside Screw Valve
Fig. 106**

Valves will be furnished with Gate Squares unless otherwise ordered.
Discs are cast iron, bronze mounted.

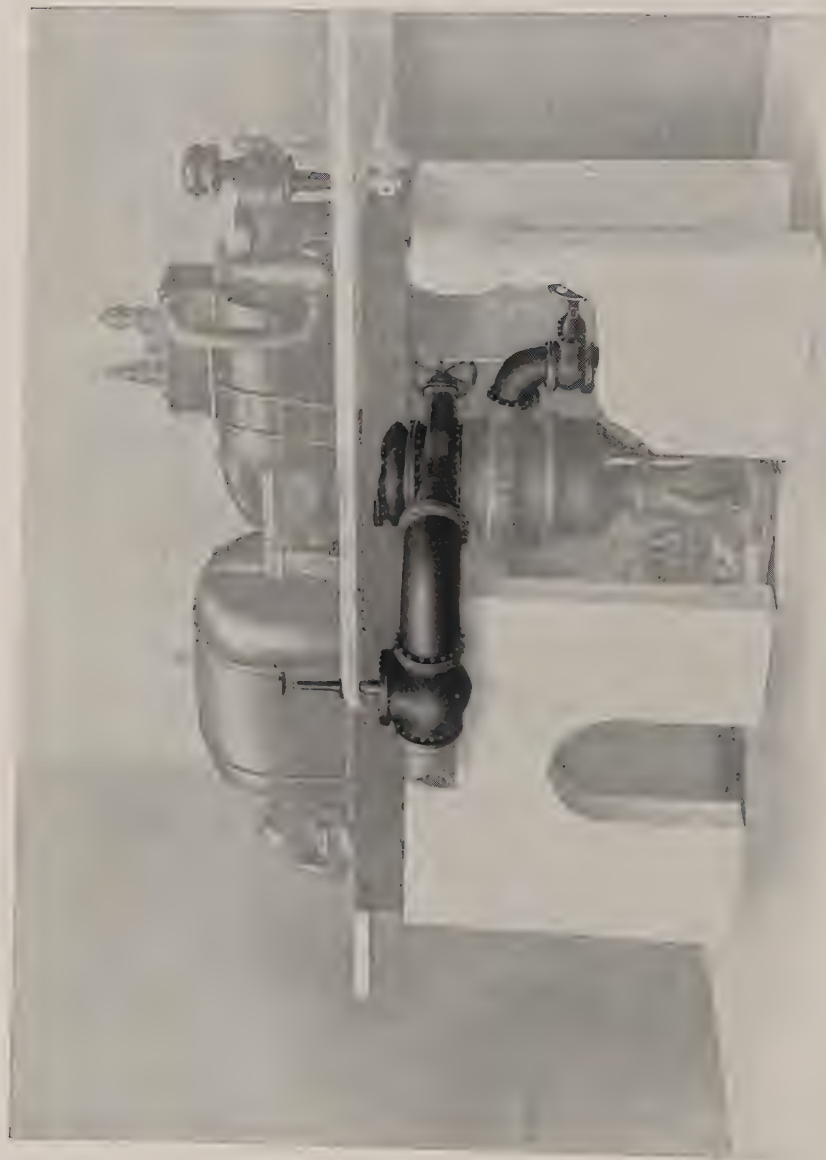
PRICE LIST

Size Inches	Each	With Gears Each	Sizes Inches	Each	With Gears Each
14	\$ 165.00	.....	32	.....	.....
16	215.00	.....	36	\$1450.00	\$1750.00
18	300.00	.....	42	1900.00	2250.00
20	345.00	.....	48	2800.00	3200.00
22	.....	.....	54	.....	.....
24	540.00	\$ 665.00	60	.....	.....
26	.....	.....	66	.....	.....
28	.....	.....	72	.....	.....
30	1025.00	1250.00			

Larger sizes, prices on application.

For dimensions, see page 366.

For description, see page 50.



The Atmospheric Outlet Gate Valve Shown Above Serves the Purpose of a Gate Valve and a Tee
This arrangement will reduce the depth of basement required for the installation of the

ATMOSPHERIC OUTLET GATE VALVES

We manufacture a line of gate valves for use between a turbine or engine and its condenser to serve the purpose of a gate valve and a tee for the free exhaust connection. This arrangement of piping is shown on page 58.

The valve is of the single disc and single seat type. The disc is held against the seat by means of wedges in the body when the valve is closed. Furnished either inside screw or outside screw and yoke. See page 367. They may be equipped with either bevel, spur or special gearing. See pages 532 to 536 and page 357.

A valve of this type, being single seated, is tight in one direction only. For dimensions see pages 367 and 368.

ATMOSPHERIC OUTLET GATE VALVES

30 POUNDS WORKING STEAM PRESSURE



Fig. 149

We have patterns for all sizes up to 72 inches. The size of outlet can be varied to suit conditions. Prices on application.

For drilling template, see page 383.

For dimensions, see pages 367 and 368.

For description, see page 59.

DESCRIPTION OF AUTOMATIC EXHAUST RELIEF VALVES

A good exhaust relief valve is a necessity on a condenser plant to protect the system from undue pressure in case of loss of vacuum. It should open promptly and without shock at the instant the pressure in the system reaches that of the atmosphere, and it should also have a device to permit of its being held open if the system is running non-condensing.

These valves are made horizontal, vertical or angle type and all are equipped with internal bronze bushed dash pots of ample size, and with water seals.

Standard valves are furnished fully bronze mounted.

PRICE LIST

VERTICAL, HORIZONTAL AND ANGLE AUTOMATIC RELIEF VALVES

Size . . . inches	6	7	8	10	12	14	15	16
Each	\$100.00	\$150.00	\$170.00	\$270.00	\$335.00	\$415.00	\$460.00	\$500.00

Size . . . inches	18	20	22	24	26	28	30	36
Each	\$584.00	\$670.00	\$917.00	\$1170.00	\$1420.00	\$1600.00	\$2000.00	\$3000.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

For drilling price list, see page 119.

For drilling template, see page 383.

For dimensions, see pages 369 to 372.

AUTOMATIC EXHAUST RELIEF VALVES



Fig. 197

Horizontal Automatic Exhaust Relief Valve—Top Operated

For description and price list, see page 61.

For dimensions, see page 369. For drilling template, see page 383.



Fig. 198

Horizontal Automatic Exhaust Relief Valve—Bottom Operated

For description and price list, see page 61.

For dimensions, see page 370. For drilling template, see page 383.

AUTOMATIC EXHAUST RELIEF VALVES



Fig. 199
Vertical Automatic Exhaust Relief Valve
For description and price list, see page 61
For dimensions, see page 372
For drilling template, see page 383

AUTOMATIC EXHAUST RELIEF VALVES



Fig. 110

Automatic Exhaust Relief Valve, Chimney Type

This type of Automatic Relief Valve is for outside use on exhaust risers. It is built to the same specifications as the types shown on pages 61 to 63 except as to water sealing.

For dimensions see page 373

Prices on application

For drilling template, see page 383

COMBINATION BACK PRESSURE AND EXHAUST RELIEF VALVES

FOR CONDENSING OR NON-CONDENSING ENGINES

PRICE LIST

Horizontal, Vertical and Angle Flanged Valves

Size.....inches	4	4½	5	6	7	8	9	10
Each	\$64.00	\$72.00	\$88.00	\$120.00	\$175.00	\$195.00	\$260.00	\$310.00

Size.....inches	12	14	15	16	18	20	22	24
Each	\$385.00	\$475.00	\$525.00	\$575.00	\$675.00	\$775.00	\$1050.00	\$1350.00

Horizontal valves should be given the preference over vertical ones wherever possible

For drilling price list, see page 119.

For drilling template, see page 383.

NOISELESS BACK PRESSURE VALVES

FOR NON-CONDENSING ENGINES ONLY

PRICE LIST

Horizontal or Vertical Flanged Valves

Size.....inches	2	2½	3	3½	4	4½	5
Each	\$14.00	\$16.00	\$18.00	\$22.00	\$25.00	\$30.00	\$40.00

Size.....inches	6	7	8	9	10	12	14
Each	\$60.00	\$80.00	\$100.00	\$120.00	\$145.00	\$220.00	\$345.00

Size.....inches	15	16	18	20	22	24
Each	\$400.00	\$465.00	\$600.00	\$750.00	\$900.00	\$1050.00

Horizontal valves should be given the preference over vertical ones wherever possible.

For drilling price list, see page 119.

For drilling template, see page 383.

LOW PRESSURE BUTTERFLY VALVES
ALL IRON
FOR PRESSURES UP TO 30 POUNDS WORKING STEAM PRESSURE

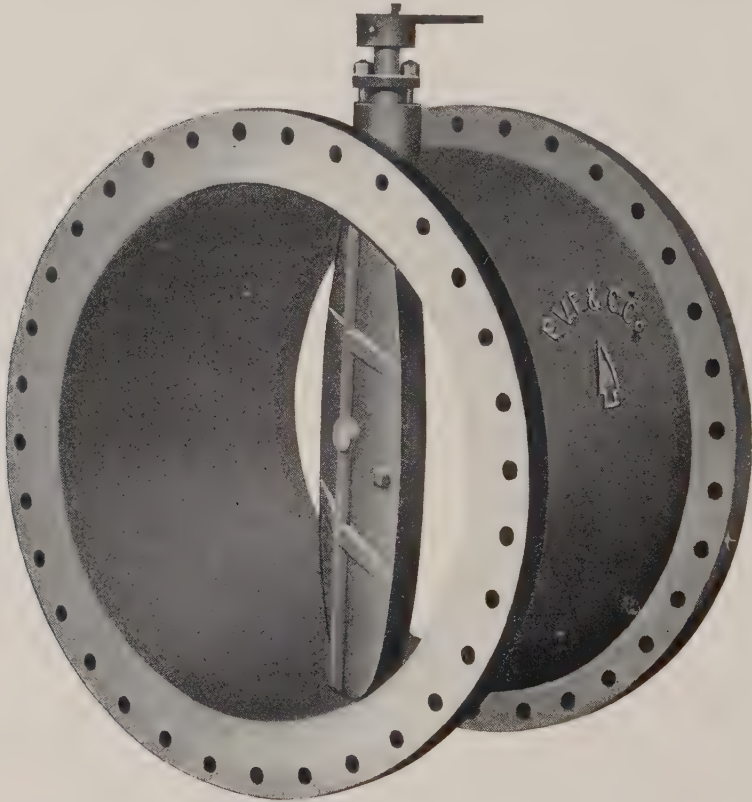


Fig. 112
PRICE LIST

Size	inches	6	8	10	12	14
Flanged	each	\$70.00	\$90.00	\$125.00	\$160.00	\$275.00
Size	inches	16	18	20	24	30
Flanged	each	\$350.00	\$425.00	\$525.00	\$700.00	\$950.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.
For drilling price list, see page 119.
For dimensions, see page 374.
For drilling template, see page 383.

TRANSFER VALVES
LOW PRESSURE STEAM
ALL IRON

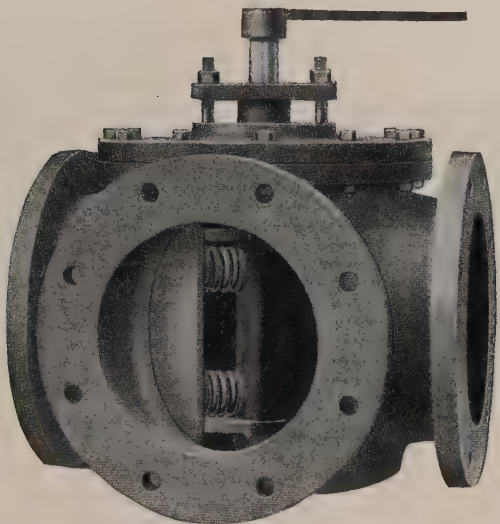


Fig. 111

These valves furnish a convenient means of handling low pressure steam, particularly in connections to feed water heaters. In addition to the advantage of quick handling, one valve takes the place of two gate valves and a tee and is about the same size as the tee; an economy in both space and material. They should be erected so that the pressure will be on the back of the disc.

PRICE LIST

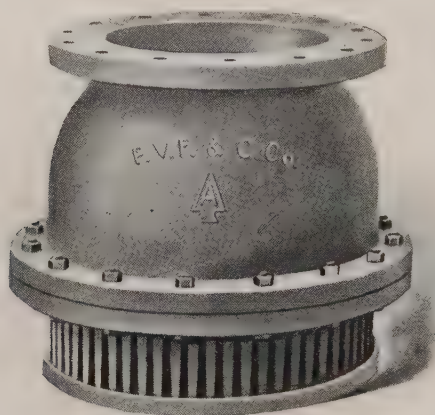
Size inches	6	8	10	12	14	16	18	20
Each	\$160 .00	\$210 .00	\$300 .00	\$350 .00	\$440 .00	\$670 .00	\$900 .00	\$1100 .00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.
For drilling price list, see page 119.
For drilling template, see page 383.
For dimensions, see page 375.

FOOT VALVES WITH STRAINERS **FOR PRESSURES UP TO 30 POUNDS**



Screwed
Fig. 150



Flanged
Fig. 113

Furnished with iron seats and leather faced discs. Furnished bronze fitted at an extra charge.

PRICE LIST

Size.....inches	4	5	6	7	8	10	12
Screwed.....each	\$7.30	\$11.25	\$14.75				
Flanged.....each	9.50	14.00	17.50	\$38.00	\$45.00	\$70.00	\$112.00

Size.....inches	14	16	18	20	24	30
Flanged.....each	\$150.00	\$200.00	\$260.00	\$320.00	\$460.00	\$720.00

Larger sizes, prices on application.
 Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.
 For drilling price list, see page 119.
 For drilling template, see page 383.
 For dimensions, see page 376.

BASKET STRAINERS
(REMOVABLE BASKET)
PRESSURES UP TO 30 POUNDS

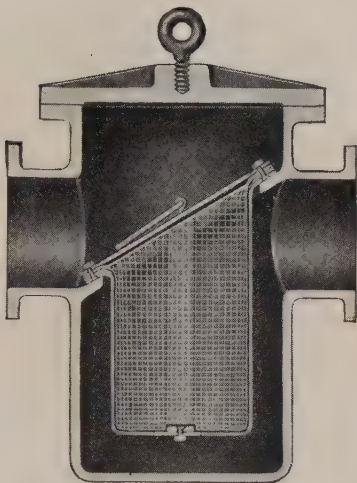


Fig. 151

PRICE LIST

Size Inches	Galvanized Wire Basket	Copper Wire Basket
3	\$215 .00	\$215 .00
4	260 .00	270 .00
5	290 .00	310 .00
6	345 .00	365 .00
8	445 .00	470 .00
10	540 .00	575 .00
12	615 .00	650 .00
14	760 .00	805 .00
16	910 .00	960 .00

Price of larger sizes quoted on application.
Extra for spotfacing, labor attaching companion flanges, and wooden protectors,
see page 78.
For drilling template, see page 383.
For dimensions, see page 377.

CAST IRON SLOTTED STRAINER



Fig. 152

PRICE LIST

Size Inches	Faced and Drilled Each	Size Inches	Faced and Drilled Each
4	\$ 55 .00	14	\$220 .00
6	88 .00	16	255 .00
8	120 .00	18	285 .00
10	152 .00	20	320 .00
12	185 .00	..	.....

Prices of larger sizes will be quoted on application.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

For drilling template, see page 383.

For dimensions, see page 378.

COPPER EXPANSION JOINTS FOR
EXHAUST



Fig. 114

PRICE LIST

Size.....inches	4	5	6	7	8	9	10
Each.....	\$110.00	\$125.00	\$140.00	\$155.00	\$170.00	\$185.00	\$200.00

Size.....inches	12	14	15	16	18	20	22
Each.....	\$225.00	\$250.00	\$275.00	\$300.00	\$350.00	\$400.00	\$450.00

Size.....inches	24	26	28	30	32	34	36
Each.....	\$500.00	\$600.00	\$650.00	\$725.00	\$800.00	\$875.00	\$950.00

Size.....inches	38	40	42	44	46	48	
Each.....	\$1000.00	\$1100.00	\$1200.00	\$1300.00	\$1400.00	\$1500.00	

Expansion joints of this type are suitable for a limited amount of expansion only, not more than ¼". Inquiries should state operating conditions.

On account of crystallization they should be reannealed at least every two years.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

For drilling template, see page 383.

For dimensions, see page 379.

GALVANIZED IRON EXHAUST HEADS



Fig. 115

PRICE LIST

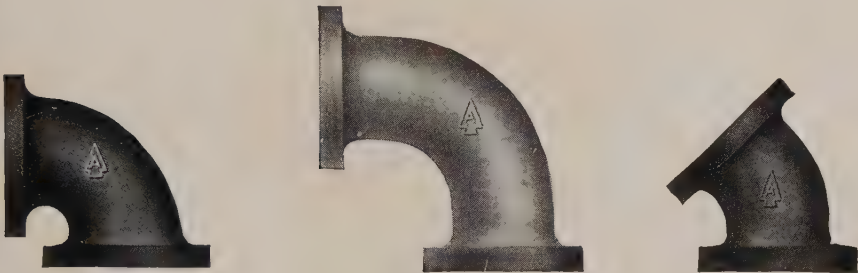
Size Inches	Screwed Each	Flanged Each	Size of Drip	Size Inches	Screwed Each	Flanged Each	Size of Drip
3	\$30 .00	.....	1	14	.....	\$200 .00	2½
4	40 .00	.....	1	16	.....	250 .00	2½
5	.....	\$50 .00	1½	18	.....	300 .00	2½
6	.....	60 .00	1½	20	.....	360 .00	2½
7	.....	75 .00	1½	22	.....	400 .00	3
8	.....	90 .00	2	24	.....	450 .00	3
9	.....	105 .00	2	26	.....	525 .00	3
10	.....	125 .00	2	28	.....	575 .00	3
12	.....	150 .00	2	30	.....	600 .00	3

Prices include drilling. Exhaust heads will not be crated for shipment unless so ordered at an extra charge.

For drilling template, see page 383.

For dimensions, see page 380.

CAST IRON FLANGED ELBOWS
STANDARD, LONG RADIUS AND 45 DEGREE
30 POUNDS WORKING PRESSURE



Standard 90° Elbow
Fig. 119

Long Radius Elbow
Fig. 120

45° Elbow
Fig. 121

PRICE LIST

Standard Elbows			L. R. Elbows			45 Degree Elbows		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
16	\$ 52.00	\$ 57.00	16	\$ 86.00	\$ 93.50	16	\$ 52.00	\$ 57.00
18	67.50	73.50	18	113.00	122.00	18	67.50	73.50
20	85.50	92.50	20	143.00	153.00	20	85.50	92.50
22	107.00	116.00	22	178.00	191.00	22	107.00	116.00
24	133.00	143.00	24	222.00	237.00	24	133.00	143.00
26	167.50	180.00	..	.....	.....	26	167.50	180.00
28	190.00	210.00	..	.....	.....	28	190.00	210.00
30	225.00	245.00	..	.....	.....	30	225.00	245.00
32	270.00	290.00	..	.....	.....	32	270.00	290.00
34	315.00	340.00	..	.....	.....	34	315.00	340.00
36	360.00	385.00	..	.....	.....	36	360.00	385.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.
For drilling template, see page 383.
For dimensions, see pages 381 and 403.
For description, see page 22.

CAST IRON FLANGED BASE ELBOWS

30 POUNDS WORKING PRESSURE



**Base Elbow
Fig. 124**

PRICE LIST

Size Inches	Faced Each	Faced and Drilled Each	Extra for Facing and Drilling Base Each
16	\$ 85.00	\$ 90.00	Prices on Application
18	100.00	106.00	
20	114.00	121.00	
22	142.00	151.00	
24	180.00	190.00	

Bases can be made square or round. Square bases will be furnished unless otherwise ordered.

Diameter and drilling of round bases correspond with standard flanges.

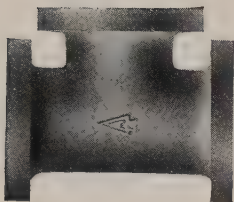
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

For drilling template, see page 383.

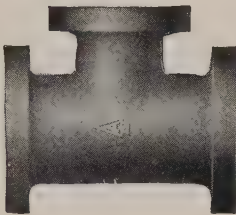
For dimensions, see page 537.

For description, see page 22.

CAST IRON FLANGED TEES
30 POUNDS WORKING PRESSURE



Standard Tee
Fig. 116



Reducing Tee
Fig. 117

PRICE LIST

Standard Tees			Reducing Tees		
Size Inches	Faced, Each	Faced and Drilled Each	Size Inches	Faced, Each	Faced and Drilled Each
16	\$ 75 .00	\$ 82 .50	16	\$ 86 .00	\$ 93 .50
18	98 .00	107 .00	18	113 .00	122 .00
20	123 .00	133 .00	20	143 .00	153 .00
22	155 .00	168 .00	22	178 .00	191 .00
24	193 .00	208 .00	24	222 .00	237 .00
26	243 .00	262 .00	26	280 .00	299 .00
28	275 .00	305 .00	28	316 .00	346 .00
30	325 .00	355 .00	30	375 .00	405 .00
32	392 .00	422 .00	32	451 .00	481 .00
34	457 .00	495 .00	34	525 .00	563 .00
36	520 .00	560 .00	36	598 .00	638 .00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

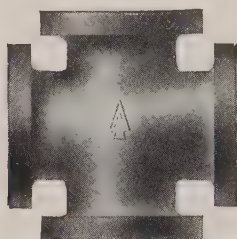
For drilling template, see page 383.

For dimensions, see page 381, 403 and 404.

For description, see page 22.

CAST IRON FLANGED CROSSES

30 POUNDS WORKING PRESSURE



Cross
Fig. 118

PRICE LIST

Standard Crosses			Reducing Crosses		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
16	\$114.00	\$124.00	16	\$130.00	\$140.00
18	150.00	162.00	18	172.00	184.00
20	188.00	202.00	20	217.00	231.00
22	235.00	253.00	22	270.00	288.00
24	290.00	310.00	24	335.00	355.00
26	370.00	395.00	26	425.00	450.00
28	420.00	460.00	28	480.00	520.00
30	495.00	535.00	30	565.00	605.00
32	595.00	635.00	32	685.00	725.00
34	690.00	740.00	34	795.00	845.00
36	790.00	840.00	36	910.00	960.00

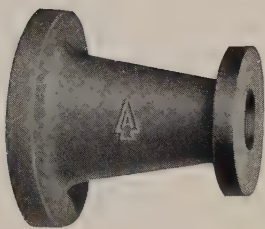
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.

For drilling template, see page 383.

For dimensions, see pages 381, 403 and 404.

For description, see page 22.

CAST IRON FLANGED REDUCERS
30 POUNDS WORKING PRESSURE



Flanged Taper Reducers
Fig. 153



Flanged Eccentric Taper Reducers
Fig. 154

Prices on Application

PRICE LIST FOR FIG. 153

Size Inches	Faced Only Each	Faced and Drilled Each	Diameter of Flanges Inches	Face to Face Inches	Size Inches	Diameter of Flanges Inches	Face to Face Inches	Size Inches	Diameter of Flanges Inches	Face to Face Inches
16 x 12	\$85.00	\$90.00	23½ x 19	18	26 x 24	34¼ x 32	26	38 x 34	48¾ x 43¾	38
16 x 14	85.00	90.00	23½ x 21	18	28 x 20	36½ x 27½	28	38 x 36	48¾ x 46	38
16 x 15	85.00	90.00	23½ x 22¼	18	28 x 22	36½ x 29½	28	40 x 32	50¾ x 41¾	40
18 x 12	100.00	106.00	25 x 19	19	28 x 24	36½ x 32	28	40 x 34	50¾ x 43¾	40
18 x 14	100.00	106.00	25 x 21	19	28 x 26	36½ x 34¼	28	40 x 36	50¾ x 46	40
18 x 15	100.00	106.00	25 x 22¼	19	30 x 22	38¾ x 29½	30	40 x 38	50¾ x 48¾	40
18 x 16	100.00	106.00	25 x 23½	19	30 x 24	38¾ x 32	30	42 x 34	53 x 43¾	42
20 x 14	114.00	121.00	27½ x 21	20	30 x 26	38¾ x 34¼	30	42 x 36	53 x 46	42
20 x 15	114.00	121.00	27½ x 22¼	20	30 x 28	38¾ x 36½	30	42 x 38	53 x 48¾	42
20 x 16	114.00	121.00	27½ x 23½	20	32 x 24	41¾ x 32	32	42 x 40	53 x 50¾	42
20 x 18	114.00	121.00	27½ x 25	20	32 x 26	41¾ x 34¼	32	44 x 36	55¼ x 46	44
22 x 15	142.00	151.00	29½ x 22¼	22	32 x 28	41¾ x 36½	32	44 x 38	55¼ x 48¾	44
22 x 16	142.90	151.00	29½ x 23½	22	32 x 30	41¾ x 38¾	32	44 x 40	55¼ x 50¾	44
22 x 18	142.00	151.00	29½ x 25	22	34 x 26	43¾ x 34¼	34	44 x 42	55¼ x 53	44
22 x 20	142.00	151.00	29½ x 27½	22	34 x 28	43¾ x 36½	34	46 x 38	57¼ x 48¾	46
24 x 16	180.00	190.00	32 x 23½	24	34 x 30	43¾ x 38¾	34	46 x 40	57¼ x 50¾	46
24 x 18	180.00	190.00	32 x 25	24	34 x 32	43¾ x 41¾	34	46 x 42	57¼ x 53	46
24 x 20	180.00	190.00	32 x 27½	24	36 x 28	46 x 36½	36	46 x 44	57¼ x 55¼	46
24 x 22	180.00	190.00	32 x 29½	24	36 x 30	46 x 38¾	36	48 x 40	59½ x 50¾	48
26 x 18	.....	.....	34¼ x 25	26	36 x 32	46 x 41¾	36	48 x 42	59½ x 53	48
26 x 20	.....	.....	34¼ x 27½	26	36 x 34	46 x 43¾	36	48 x 44	59½ x 55¼	48
26 x 22	.....	.....	34½ x 29½	26	38 x 30	48¾ x 38¾	38	48 x 46	59½ x 57¼	48
.....	.....	.....	.....	..	38 x 32	48¾ x 41¾	38	.....	.....	..

Flanged Eccentric Taper Reducers will be made to order only.
Flanged Taper Reducers not listed above, or of any other dimensions, will be made to order.
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 78.
For drilling template, see page 383.
For dimensions, see page 382.

**ATTACHING COMPANION FLANGES
TO
LOW PRESSURE CAST IRON FLANGED FITTINGS
AND VALVES**

EXTRA NET PRICE LIST

Size of Fitting or Valve	Bolting Companion Flanges to Fittings Not Including Bolts or Gaskets For Labor Only	Wooden Protectors Bolted on with Two Bolts
Inches	Each Flange	Each Flange
1¼	\$0.10	\$0.20
1½	.10	.20
2	.10	.20
2½	.10	.20
3	.10	.25
3½	.10	.25
4	.10	.25
4½	.15	.25
5	.15	.25
6	.15	.25
7	.15	.30
8	.15	.30
9	.20	.30
10	.20	.35
12	.20	.35
14	.20	.40
15	.25	.40
16	.25	.45
18	.25	.45
20	.25	.50
22	.25	.50
24	.25	.50

Spotfacing bolt holes, five cents net, extra, for each hole.

Sizes above 24 inches, prices on application.

The above net prices apply to both Straight and Reducing Flanged Fittings, Flanges and Valves.

MATERIAL FOR “STANDARD” PRESSURE STEAM AND WATER LINES

These valves and fittings are suitable for working pressures up to 125 pounds per square inch, steam.

When placing orders for material, give pressure and service for which it is required.

The templates for drilling shown on page 408 correspond with the American Standard for 125 pounds. All standard templates have bolt holes drilled in multiples of four, straddling center lines. Special drilling will be furnished if so desired.

All material will be furnished with flanges faced only unless otherwise ordered.

General dimensions of valves and fittings in this section will be found on pages 384 to 409.

Face to face of flanged reducing fittings is dependent on the size of the outlet. See page 404.

“STANDARD” PRESSURE GATE VALVES

No. 2 P

We recommend this type of valve for water, exhaust, air and gas, at standard pressure. They have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them. The discs for these valves, sizes 3 inch and smaller, are bronze. All sizes above 3 inch are cast iron bronze mounted.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made all iron, or with bronze or special mountings.

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel when both are forced outward against their respective seats. In the smaller sizes these wedges are solid bronze, and in larger sizes cast iron bronze mounted. This bronze mounting is cast into the iron in such a way as to make it impossible for it to become detached. It is thus seen that the wedging mechanism, being non-corrosive, cannot interlock and fail to open.

Valves 18 inches and above have the discs carried on bronze rollers working in bronze bushed bearings. These rollers are placed on both edges of the discs so that the valves can be installed with either disc to the pressure.

When gearing is necessary our standard types of bevel and spur gears can be made to suit almost any condition. See pages 532 to 536. If special conditions exist these types can be varied.

We are prepared to furnish any desired special operating mechanism, such as cylinders for air, water or steam; or motor drives. (See pages 30 to 42.)

Outside screw and yoke valves are backseated for repacking as shown in Figure 206, page 50.

Unless otherwise ordered all valves are made to open by turning the wheel or nut to the left, viz., opposite the motion of the hands of a clock.

When so ordered standard valves will be equipped with by-passes. The by-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working Pressure.

Whether screw ends, flange or hub ends.

Service—whether for steam, water, gas, etc.

Whether all iron or iron body bronze mounted.

Whether inside screw or outside screw and yoke.

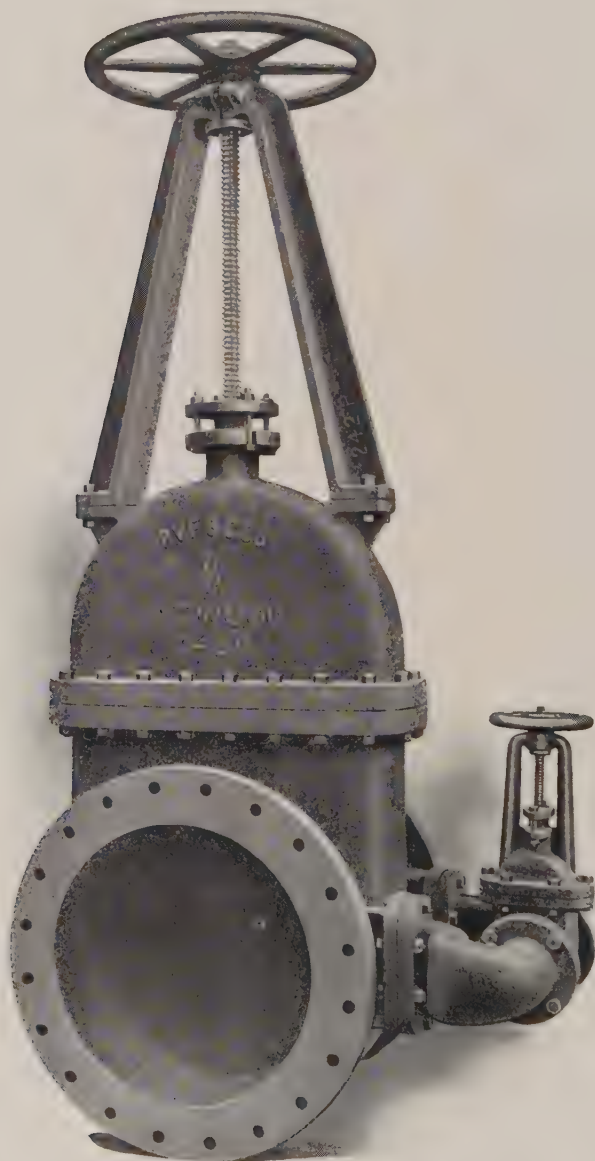
Whether gearing is required: if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.



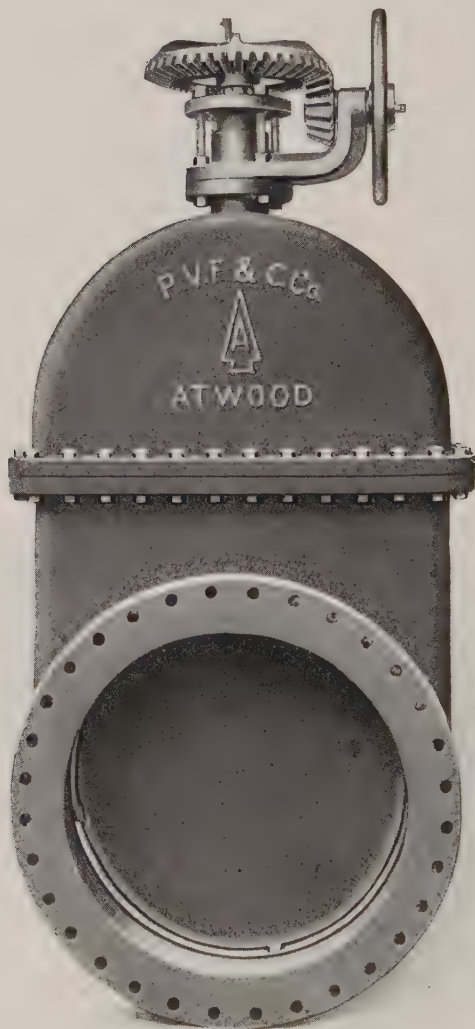
ATWOOD



24-Inch Flanged O. S. & Y. Valve with By-pass



**48-Inch Double Spindle Gate Valve for Water
Bevel Geared and By-passed**

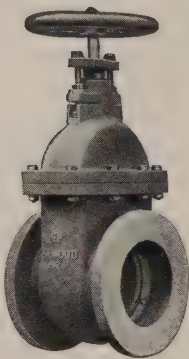


Flanged Gate Valve with Bevel Gears
Inside Screw

STANDARD GATE VALVES No. 2 P

INSIDE SCREW

BRONZE MOUNTED. PARALLEL SEAT.



The minimum opening through these valves is 100 per cent of the pipe area

Inside Screw Valve Fig. 209

12-INCH AND SMALLER
Working Steam Pressure—125 Pounds
Working Water Pressure—175 Pounds

14-INCH AND 16-INCH
Working Steam Pressure—125 Pounds
Working Water Pressure—150 Pounds

18-INCH AND LARGER
Working Steam Pressure—100 Pounds
Working Water Pressure—120 Pounds
Suitable for Water, Steam, Gas, Air, Oil, etc.

Unless otherwise specified, Bronze Mounted Valves with bronze stems will be furnished.

The discs for these valves, sizes 3 inch and smaller, are bronze. All sizes above 3 inch are cast iron bronze mounted.

PRICE LIST

Size Inches	Inside Screw							
	Inside Screw				With Indicator		All Iron	
	Screwed Each	Flanged Each	Flanged with Gear Each	Flanged with Gear and B.P. Each	Screwed Each	Flanged Each	Screwed Each	Flanged Each
2	\$ 10.00	\$ 12.00	\$ . . . . .	. . . . .	\$ 17.50	\$ 19.50	\$ 10.00	\$ 12.00
2½	11.50	13.50	. . . . .	. . . . .	19.00	21.00	11.50	13.50
3	14.00	16.50	. . . . .	. . . . .	22.00	24.50	14.00	16.50
3½	17.00	19.50	. . . . .	. . . . .	25.00	27.50	17.00	19.50
4	19.00	23.00	. . . . .	. . . . .	30.00	34.00	19.00	23.00
4½	24.00	28.00	. . . . .	. . . . .	37.00	41.00	24.00	28.00
5	27.50	31.50	. . . . .	. . . . .	42.00	46.00	27.50	31.50
6	32.50	36.50	. . . . .	. . . . .	48.00	52.00	32.50	36.50
7	45.00	49.00	. . . . .	. . . . .	64.00	68.00	45.00	49.00
8	54.00	58.00	. . . . .	. . . . .	80.00	84.00	54.00	58.00
9	76.00	81.00	. . . . .	. . . . .	105.00	110.00	76.00	81.00
10	90.00	95.00	. . . . .	. . . . .	122.00	127.00	90.00	95.00
12	125.00	133.00	. . . . .	. . . . .	160.00	168.00	125.00	133.00
14	. . . . .	181.00	. . . . .	. . . . .	. . . . .	236.00	. . . . .	181.00
15	. . . . .	220.00	. . . . .	. . . . .	. . . . .	285.00	. . . . .	220.00
16	. . . . .	260.00	\$ 360.00	\$ 425.00	. . . . .	325.00	. . . . .	260.00
18	. . . . .	350.00	460.00	535.00	. . . . .	435.00	. . . . .	350.00
20	. . . . .	425.00	550.00	635.00	. . . . .	525.00	. . . . .	425.00
22	. . . . .	530.00	675.00	775.00	. . . . .	650.00	. . . . .	530.00
24	. . . . .	600.00	750.00	850.00	. . . . .	725.00	. . . . .	600.00
26	. . . . .	800.00	1000.00	1125.00	. . . . .	950.00	. . . . .	800.00
28	. . . . .	950.00	1200.00	1350.00	. . . . .	1125.00	. . . . .	950.00
30	. . . . .	1100.00	1400.00	1550.00	. . . . .	1300.00	. . . . .	1100.00
36	. . . . .	. . . . .	2100.00	2300.00	. . . . .	. . . . .	. . . . .	. . . . .
42	. . . . .	. . . . .	3150.00	3400.00	. . . . .	. . . . .	. . . . .	. . . . .
48	. . . . .	. . . . .	4300.00	4600.00	. . . . .	. . . . .	. . . . .	. . . . .

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120. For drilling price list, see page 119. For drilling template, see page 408. For dimensions, see page 384. For description, see page 80.

STANDARD GATE VALVES No. 2 P

OUTSIDE SCREW AND YOKE

BRONZE MOUNTED. PARALLEL SEAT.

The minimum opening through these valves is 100 per cent of the pipe area



Outside Screw and Yoke Valve
Fig. 210

12-INCH AND SMALLER

Working Steam Pressure—125 Pounds
Working Water Pressure—175 Pounds

14-INCH AND 16-INCH

Working Steam Pressure—125 Pounds
Working Water Pressure—150 Pounds

18-INCH AND LARGER

Working Steam Pressure—100 Pounds
Working Water Pressure—120 Pounds

Suitable for Water, Steam, Gas, Air, Oil, etc.

Unless otherwise specified, valves will be furnished with steel stems, heavily copper plated.

The discs for these valves sizes 3 inch and smaller, are bronze. All sizes above 3 inch are cast iron bronze mounted.

PRICE LIST

Size Inches	Outside Screw and Yoke						Extra for Gearing
	Steel Stem		Bronze Stem		All Iron		
	Screwed Each	Flanged Each	Screwed Each	Flanged Each	Screwed Each	Flanged Each	
2	\$ 17.50	\$ 19.50	\$ 19.00	\$ 21.00	\$ 17.50	\$ 19.50	.....
2½	19.00	21.00	20.50	22.50	19.00	21.00	.....
3	22.00	24.50	23.50	26.00	22.00	24.50	.....
3½	25.00	27.50	27.00	29.50	25.00	27.50	.....
4	30.00	34.00	32.50	36.50	30.00	34.00	.....
4½	37.00	41.00	40.00	44.00	37.00	41.00	.....
5	42.00	46.00	45.00	49.00	42.00	46.00	.....
6	48.00	52.00	52.00	56.00	48.00	52.00	.....
7	64.00	68.00	69.00	73.00	64.00	68.00	.....
8	80.00	84.00	86.00	90.00	80.00	84.00	.....
9	105.00	110.00	113.00	118.00	105.00	110.00	.....
10	122.00	127.00	131.00	136.00	122.00	127.00	.....
12	160.00	168.00	172.00	180.00	160.00	168.00	.....
14	.....	236.00	.....	255.00	.....	236.00	.....
15	.....	285.00	.....	310.00	.....	285.00	.....
16	.....	325.00	.....	350.00	.....	325.00	\$ 100.00
18	.....	435.00	.....	470.00	.....	435.00	110.00
20	.....	525.00	.....	565.00	.....	525.00	125.00
22	.....	650.00	.....	700.00	.....	650.00	145.00
24	.....	725.00	.....	775.00	.....	725.00	150.00
26	.....	950.00	.....	1025.00	.....	950.00	200.00
28	.....	1125.00	.....	1210.00	.....	1125.00	250.00
30	.....	1300.00	.....	1400.00	.....	1300.00	300.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

For drilling price list, see page 119. For drilling template, see page 408. For dimensions, see page 384. For description, see page 80.

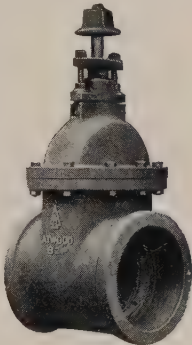
STANDARD HUB END GATE
VALVES No. 2 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT

TEST PRESSURE 300 POUNDS
FOR WORKING WATER PRESSURES

Sizes 12-inch and smaller—175 pounds
Sizes 14-inch and 16-inch—150 pounds
Sizes 18-inch and larger—120 pounds

The minimum
opening through
these valves is 100
per cent of the
pipe area



Inside Screw Valve
Fig. 211

Suitable for underground bell and spigot piping.
All water valves are full bronze mounted with bronze stem.
Unless otherwise specified, valves will be furnished with gate square.
The discs for these valves, sizes 3 inch and smaller, are bronze. All sizes above 3 inch are cast iron bronze mounted.

PRICE LIST—INSIDE SCREW

Size.Inches	2	3	4	5	6	7	8	10	12
Each	\$10.00	\$14.00	\$19.00	\$27.50	\$32.50	\$45.00	\$54.00	\$90.00	\$125.00

Size.inches	14	16	18	20	24	30	36	42	48
Each	\$173.00	\$250.00	\$340.00	\$415.00	\$590.00	\$1075.00	.....	.....	.....
With By-Pass	.....	315.00	415.00	500.00	690.00	1225.00	.....	.....	.....
“ Gear	.....	350.00	450.00	540.00	740.00	1375.00	\$2050.00	\$3100.00	\$4250.00
“ By-Pass & Gear	.....	415.00	525.00	625.00	840.00	1525.00	2250.00	3350.00	4550.00

For dimensions, see page 388.
For description, see page 80.

STANDARD QUICK OPENING GATE VALVES No. 2 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT

THESE VALVES ARE BEST SUITED FOR WATER SERVICE

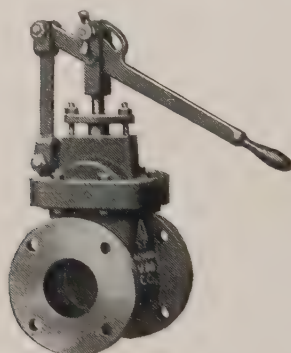


Fig. 212

Sizes	Working Pressure
4 inch and smaller.....	125 pounds
5 inch to 8 inch, inclusive.....	50 pounds
10 inch and 12 inch.....	15 pounds
14 inch to 16 inch, inclusive.....	10 pounds

These valves are tested to 250 pounds pressure per square inch, but we recommend them for the pressures as listed, for easy operation with a pull of 75 pounds with the lever as furnished.

NOTE.—When one of these valves operates in a water line under pressure, an air chamber should be placed in the line close to the inlet side of the valve to minimize water ram.

The discs for these valves, sizes 3 inch and smaller, are bronze. All sizes above 3 inch are cast iron bronze mounted.

PRICE LIST

Size.....inches	2	2½	3	3½	4	4½	5	6
Screwed each	\$17.50	\$19.00	\$22.00	\$25.00	\$30.00	\$37.00	\$42.00	\$48.00
Flanged each	19.50	21.00	24.50	27.50	34.00	41.00	46.00	52.00
Size.....inches	7	8	9	10	12	14	15	16
Screwed.....each	\$64.00	\$80.00	\$105.00	\$122.00	\$160.00			
Flanged each	68.00	84.00	110.00	127.00	168.00	\$236.00	\$285.00	\$325.00

Extra for spottacing, labor attaching companion flanges, and wooden protectors see page 120.

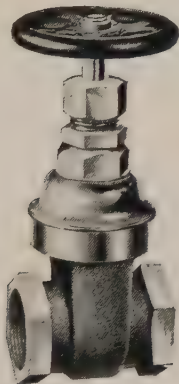
For drilling price list, see page 110.

For drilling template, see page 408.

For dimensions, see page 389.

For description, see page 80.

STANDARD BRASS GATE VALVES



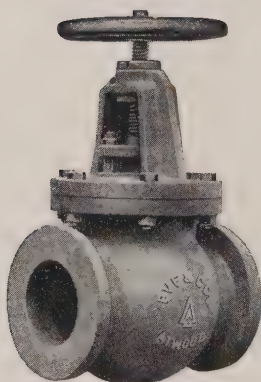
Inside Screw Valve
Fig. 246

PRICE LIST—SCREWED

Size.....inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....each	\$1.45	\$1.45	\$1.65	\$2.05	\$2.80	\$3.70	\$5.00	\$7.30	\$13.00	\$19.00

FLANGED GLOBE AND ANGLE VALVES

125 POUNDS WORKING PRESSURE



Globe Valve
Fig. 213

The Minimum Opening
Through These Valves Is
100 Per Cent of the
Pipe Area

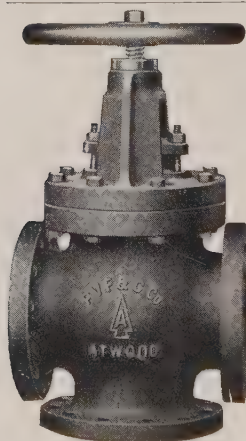
For drilling price list, see page 119.
For drilling template, see page 408.
For dimensions, see page 390.



Angle Valve
Fig. 214

PRICE LIST

Size.....inches	6	7	8	10	12	14	16	18	20	22	24
Screwed..each	\$37.50	\$63.00	\$72.00	\$114.00	\$170.00	Prices on Application					
Flanged..each	42.00	68.00	77.00	123.00	187.00						



Cross Valve
Fig. 215

FLANGED CROSS VALVES

125 POUNDS WORKING PRESSURE

For drilling price list, see page 119.
For drilling template, see page 408.
For dimensions, see page 390.

PRICE LIST

Size.....inches	6	7	8	10	12	14	16	18	20	22	24
Flanged..each	\$54.00	\$85.00	\$100.00	\$175.00	\$265.00	Prices on Application					

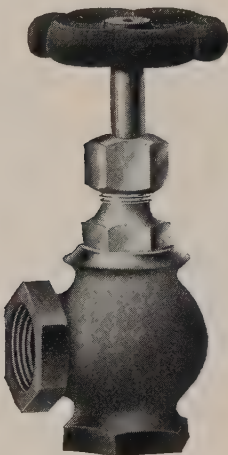
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

The discs for these valves are bronze for sizes 7 inch and smaller. All sizes above 7 inch are cast iron bronze mounted.

STANDARD GLOBE AND ANGLE
VALVES
BRASS



Globe Valve
Fig. 247



Angle Valve
Fig. 248

PRICE LIST—SCREWED

Size inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Each	\$.72	\$.72	\$.77	\$ 1.00	\$ 1.26	\$ 1.80	\$ 2.52	\$ 3.50	\$ 5.30	\$ 10.00	\$ 14.40	\$ 26.50	\$ 36.00

FLANGED FLOAT VALVES FOR OPEN TANK SERVICE

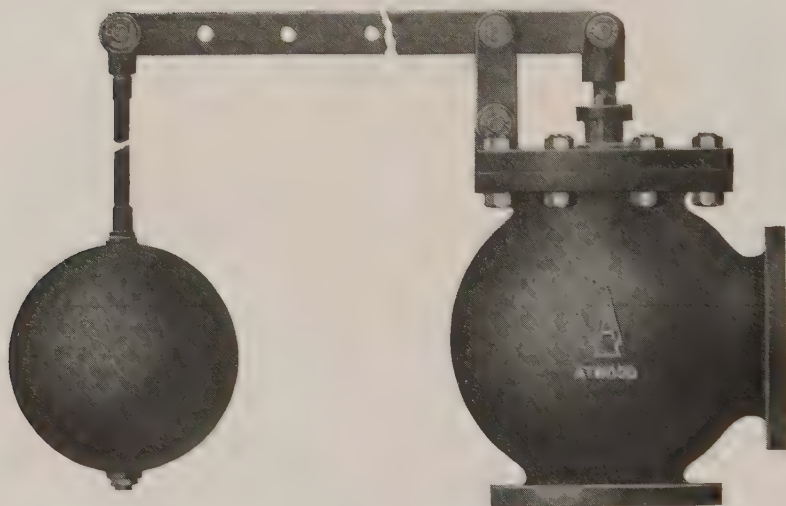


Fig. 295

The Minimum Opening Through These Valves Is 100 Per Cent of the
Pipe Area

PRICE LIST

Size, inches	2	2½	3	4	5	6	7	8	10	12
Each.	\$38.00	\$50.00	\$62.00	\$84.00	\$108.00	\$128.00	\$152.00	\$172.00	\$220.00	\$300.00

Prices with positive shut-off screw, quoted upon application.

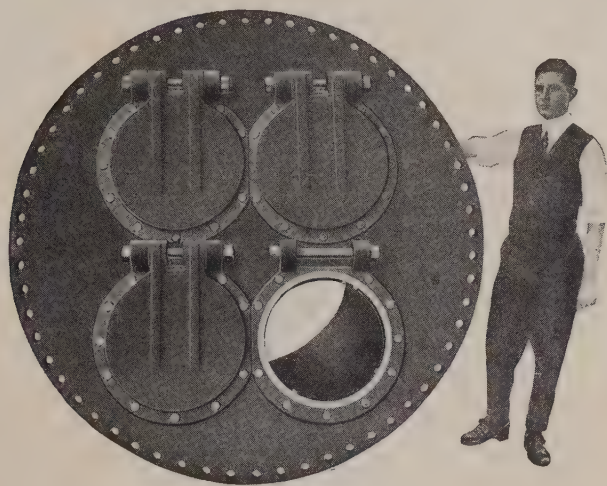
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

When ordering, state whether globe or angle type is desired.

For drilling price list, see page 119.

For drilling template, see page 408.

For dimensions, see page 391.



36-Inch Multiple Check Valve with Removable Seats and Discs

FLANGED IRON BODY SWING CHECK VALVES

**175 POUNDS WORKING WATER PRESSURE
300 POUNDS TEST**



Fig. 296

**The Minimum Opening Through These Valves Is 100
Per Cent of the Pipe Area**

PRICE LIST

Size.....inches	2½	3	3½	4	4½	5
Screwed Ends.....each	\$12.00	\$13.50	\$17.50	\$20.00	\$26.00	\$30.00
Flanged Ends.....each	14.50	17.00	21.00	24.00	30.00	34.00
Add for Leather Disc.....each	1.50	2.00	2.50	3.00	3.50	4.00
Hub Ends with Leather Disc, each	.....	19.00	.....	27.00	.....	38.00
Size.....inches	6	7	8	10	12	14
Screwed Ends.....each	\$36.00	\$55.00	\$70.00	\$110.00	\$160.00	.....
Flanged Ends.....each	41.00	60.00	75.00	115.00	168.00	\$340.00
Add for Leather Disc.....each	4.00	6.00	7.50	10.00	12.00	.....
Hub Ends with Leather Disc, each	45.00	.....	82.50	125.00	185.00	340.00
Size.....inches	15	16	18	20	24	30
Flanged Ends.....each	\$400.00	\$450.00	\$600.00	\$700.00	\$1000.00	\$1650.00
Hub Ends with Leather Disc, each	.....	450.00	600.00	700.00	1000.00	1650.00

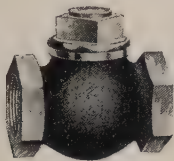
Unless otherwise ordered, check valves will be furnished with bronze mounted discs.
Extra for spotfacing, labor attaching companion flanges, and wooden protectors.
see page 120.

For drilling price list, see page 119.

For drilling template, see page 408.

For dimensions, see page 392.

STANDARD BRASS CHECK VALVES



Horizontal—Fig. 249

PRICE LIST—LIFT CHECK, SCREWED

Size...inches	1⁄8	1⁄4	3⁄8	1⁄2	3⁄4	1	1 1⁄4	1 1⁄2	2	2 1⁄2	3	3 1⁄2	4
Each.....	\$.65	\$.65	\$.70	\$.90	\$ 1.15	\$ 1.60	\$ 2.25	\$ 3.15	\$ 4.75	\$ 9.00	\$ 13.00	\$ 24.00	\$ 32.50

PRICE LIST—SWING CHECK, SCREWED

Size.....inches	3⁄8	1⁄2	3⁄4	1	1 1⁄4	1 1⁄2	2	2 1⁄2	3
Brass Disc...each	\$ 1.80	\$ 2.00	\$ 2.25	\$ 2.80	\$ 3.65	\$ 4.75	\$ 6.75	\$ 15.00	\$ 24.00
Leather Disc. each	2.40	2.65	2.90	3.60	4.65	6.00	8.25	.....	.....

Valves with Brass Disc will always be furnished unless otherwise ordered.



Vertical—Fig. 250



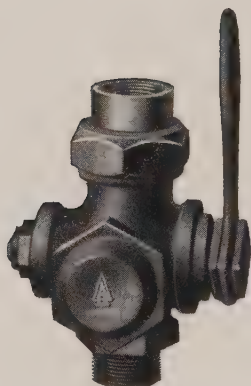
Angle—Fig. 251

PRICE LIST—LIFT CHECK, SCREWED

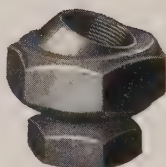
Size.....inches	1⁄8	1⁄4	3⁄8	1⁄2	3⁄4	1	1 1⁄4	1 1⁄2	2
Vertical.....each	...	\$.72	\$.77	\$ 1.00	\$ 1.26	\$ 1.80	\$ 2.52	\$ 3.50	\$ 5.30
Angle.....each	\$.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30

TUYERE COCKS AND UNIONS BRONZE

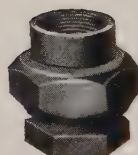
“ATWOOD” PATTERN



Tuyere Cock
Fig. 297



Tuyere Cock Unions
Universal
Fig. 298



Tuyere Cock Unions
Straight
Fig. 299

PRICE LIST

Size.....inches	1¼	1½
Tuyere Cocks, Fig. 297.....each	\$10.00	\$18.00
Straight Unions, Fig. 299.....each	4.00	5.25
Universal Unions, Fig. 298.....each	8.00	10.50

These Tuyere Cocks and Unions are of the same standard of quality which brought them into such extensive use at blast furnace plants all over the country. Ample weight and the best of material give a guarantee of satisfaction. For Sectional Views (see page 393).

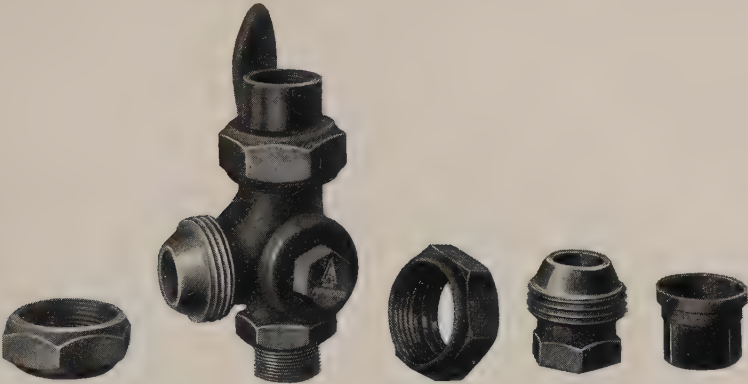
The “Atwood Pattern” above is right-hand, i. e., the side outlet is on the right hand side when the male end is upward and the wrench toward the operator. Unless otherwise specified, all orders will be filled “right-hand.”

The threads on the parts of the Tuyere Cock Unions are interchangeable with the threads on the Tuyere Cocks.

For sectional view of Tuyere Cock, see page 393.

For sectional view of Unions, see pages 397 and 398.

TUYERE COCKS AND UNIONS—BRONZE



Tuyere Cock
Fig. 2001

Tuyere Cock Union
Fig. 2002

“SNYDER” PATTERN (Coarse Thread)

PRICE LIST

Size.....	.....inches	1¼	1½
Tuyere Cock.....	each	\$10.00	\$18.00
Tuyere Cock Union.....	each	4.00	5.25

The threads on the parts of the Tuyere Cock Unions are interchangeable with the threads on the Tuyere Cocks.
For sectional view, see page 399 for Union, and page 394 for Tuyere Cocks.



Tuyere Cock
Fig. 2003

Tuyere Cock Union
Fig. 2004

“BEST” PATTERN No. 6

PRICE LIST

Size.....	.....inches	1¼	1½
Tuyere Cock.....	each	\$10.00	\$18.00
Tuyere Cock Union.....	each	4.00	5.25

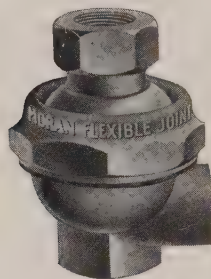
The threads on the parts of the Tuyere Cock Unions are interchangeable with the threads on the Tuyere Cocks.
For sectional view, see page 400 for Union, and page 395 for Tuyere Cock.
“Best” Pattern No. 11 same as Atwood Pattern, see page 96.

FLEXIBLE COUPLINGS

FOR STEAM, AIR AND GAS



Straightway
Fig. 994



Angle
Fig. 995

PRICE LIST

Size.....inches		$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
200 Pounds or Less	Straightway	\$6.00	\$ 6.00	\$ 6.50	\$ 7.50	\$ 8.50	\$10.50	\$12.00	\$ 15.00	\$ 18.00
	Angle	6.50	6.50	7.00	8.00	9.00	11.00	12.50	17.50	21.00
200 to 1000 Pounds	Straightway	.....	.....	13.50	16.50	19.50	21.00	22.50	27.00	.....
	Angle	.....	.....	15.00	18.00	21.00	22.50	24.50	28.50	.....

Size.....inches			3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	8	10
200 Pounds or Less	Straightway	.....	\$22.50	\$28.00	\$30.00	\$37.50	\$37.50	\$60.00	\$144.00	\$260.00
	Angle	.....	24.50	31.00	33.50	41.50	41.75	75.00	165.00	300.00

All sizes screwed, standard thread.

UNBALANCED EXPANSION JOINTS
125 POUNDS WORKING STEAM PRESSURE

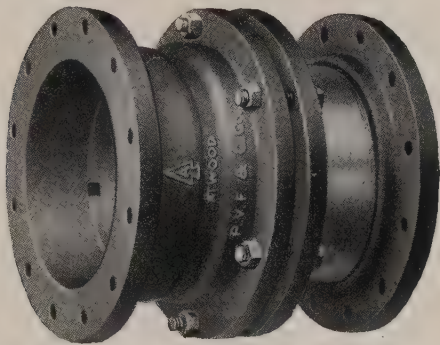


Fig. 218

NOTE—This expansion joint is so constructed that the brass sleeve cannot be blown out. See page 396.

FLANGED

Size.....inches		2	2½	3	3½	4	4½
6-inch Traverse.	Price.....each	\$18.00	\$ 20.00	\$ 25.00	\$ 35.00	\$ 40.00	\$ 50.00
12-inch Traverse.	Price.....each	25.50	29.00	36.50	50.00	58.00	70.00

Size.....inches		5	6	7	8	10	12
6-inch Traverse.	Price.....each	\$55.00	\$ 65.00	.....	.....	.....	.....
12-inch Traverse.	Price.....each	80.00	102.50	\$127.00	\$170.00	\$255.00	\$350.00

Expansion Joints are not furnished packed unless so ordered, and then at a special price. If wanted packed specify kind of packing required.

Standard Expansion Joints will be made to order with base or side outlet. Prices on application.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

For drilling price list, see page 119.

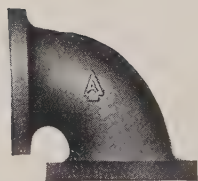
For drilling template, see page 408.

For dimensions, see page 396.

CAST IRON FLANGED ELBOWS

STANDARD, LONG RADIUS AND 45 DEGREE

125 POUNDS WORKING STEAM PRESSURE



Standard 90° Elbow
Fig. 222



Long Radius Elbow
Fig. 223



45° Elbow
Fig. 224

PRICE LIST

Standard Elbows			Long Radius Elbows			45 Degree Elbows		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$ 3.00	\$ 3.60	.....	.....	.....	1¼	\$ 3.30	\$ 3.90
1½	3.00	3.60	.....	.....	.....	1½	3.30	3.90
2	3.00	3.60	2	\$ 5.00	\$ 5.90	2	3.30	3.90
2½	3.15	3.75	2½	5.25	6.15	2½	3.50	4.10
3	3.45	4.15	3	5.75	6.85	3	3.80	4.50
3½	4.05	4.90	3½	6.75	8.00	3½	4.50	5.35
4	4.50	5.50	4	7.50	9.00	4	5.00	6.00
4½	5.50	6.50	4½	9.25	10.75	4½	6.00	7.00
5	6.25	7.25	5	10.50	12.00	5	6.90	7.90
6	7.60	8.90	6	12.65	14.60	6	8.35	9.65
7	10.50	12.00	7	17.50	19.75	7	11.00	12.50
8	12.00	13.60	8	20.00	22.40	8	12.60	14.20
9	17.00	19.25	9	28.50	31.85	9	17.75	20.00
10	19.00	21.70	10	31.50	35.50	10	20.00	22.70
12	28.00	31.00	12	46.50	51.00	12	29.50	32.50
14	41.50	45.25	14	69.00	74.50	14	41.50	45.25
15	47.00	51.50	15	78.00	84.75	15	47.00	51.50
16	54.50	59.50	16	91.00	98.50	16	54.50	59.50
18	71.00	77.00	18	118.00	127.00	18	71.00	77.00
20	90.00	97.00	20	150.00	160.00	20	90.00	97.00
22	113.00	122.00	22	189.00	202.00	22	113.00	122.00
24	140.00	150.00	24	233.00	248.00	24	140.00	150.00

Prices on larger sizes upon application.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

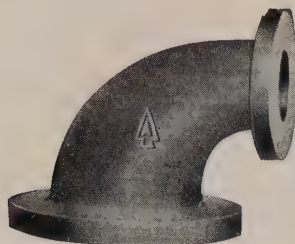
For dimensions, see pages 401 to 403.

For drilling template, see page 408.

For description, see page 22.

CAST IRON FLANGED REDUCING ELBOWS

125 POUNDS WORKING STEAM PRESSURE



Reducing Elbow
Fig. 252

PRICE LIST

Size Inches	Faced Each	Faced and Drilled Each	Center to Face Inches	Size Inches	Faced Each	Faced and Drilled Each	Center to Face Inches
3 x 1½	\$ 6.90	\$ 7.60	5½	8 x 6	\$ 24.00	\$ 25.60	9
3 x 2	6.90	7.60	5½	8 x 7	24.00	25.60	9
3 x 2½	6.90	7.60	5½	9 x 6	34.00	36.25	10
3½ x 2	8.10	8.95	6	9 x 8	34.00	36.25	10
3½ x 2½	8.10	8.95	6	10 x 4½	38.00	40.70	11
3½ x 3	8.10	8.95	6	10 x 5	38.00	40.70	11
4 x 2	9.00	10.00	6½	10 x 6	38.00	40.70	11
4 x 2½	9.00	10.00	6½	10 x 7	38.00	40.70	11
4 x 3	9.00	10.00	6½	10 x 8	38.00	40.70	11
4 x 3½	9.00	10.00	6½	10 x 9	38.00	40.70	11
4½ x 2½	11.00	12.00	7	12 x 6	56.00	59.00	12
4½ x 3½	11.00	12.00	7	12 x 7	56.00	59.00	12
4½ x 4	11.00	12.00	7	12 x 8	56.00	59.00	12
5 x 2½	12.50	13.50	7½	12 x 10	56.00	59.00	12
5 x 3	12.50	13.50	7½	14 x 10	70.00	73.75	14
5 x 4	12.50	13.50	7½	14 x 12	70.00	73.75	14
6 x 2½	15.25	16.55	8	15 x 10	80.00	84.50	14½
6 x 3	15.25	16.55	8	15 x 12	80.00	84.50	14½
6 x 3½	15.25	16.55	8	16 x 12	90.00	95.00	15
6 x 4	15.25	16.55	8	16 x 14	90.00	95.00	15
6 x 5	15.25	16.55	8	16½ x 15	90.00	95.00	15
7 x 5	21.00	22.50	8½	18 x 15	105.00	111.00	16½
7 x 6	21.00	22.50	8½	18 x 16	105.00	111.00	16½
8 x 3½	24.00	25.60	9	20 x 14	120.00	127.00	18
8 x 4	24.00	25.60	9	20 x 16	120.00	127.00	18
8 x 5	24.00	25.60	9	20 x 18	120.00	127.00	18

Flanged Taper Reducing Elbows not listed above will be made to order at a special price.

Furnished faced only, unless otherwise ordered.

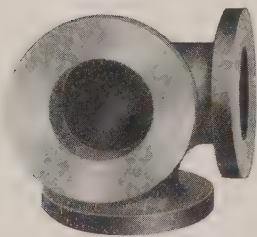
Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 120.

For drilling template, see page 408.

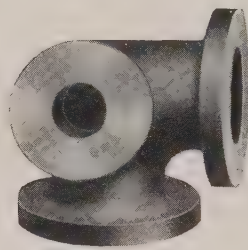
For description, see page 22.

CAST IRON FLANGED SIDE OUTLET ELBOWS

125 POUNDS WORKING STEAM PRESSURE



Flanged Side Outlet
Elbow
Fig. 2005



Flanged Side Outlet
Reducing Elbow
Fig. 2006

PRICE LIST—Fig. 2005

Size.....inches	4	5	6	7	8	10	12	14	16
Faced...each	\$26.50	\$28.50	\$33.00	\$40.25	\$47.50	\$76.00	\$100.50	\$129.50	\$152.50
Faced and Drilled...each	\$28.00	\$30.00	\$35.00	\$42.50	\$50.00	\$80.00	\$105.00	\$135.00	\$160.00

PRICE LIST—Fig. 2006

Size.....inches	4	5	6	7	8	10	12	14	16
Faced...each	\$29.50	\$31.50	\$36.00	\$44.75	\$52.50	\$84.00	\$110.50	\$144.50	\$167.50
Faced and Drilled...each	\$31.00	\$33.00	\$38.00	\$47.00	\$55.00	\$88.00	\$115.00	\$150.00	\$175.00

Orders should specify whether outlet is to be on radial or intersecting center lines.

Larger sizes made to order. Prices on application.

Furnished faced only, unless otherwise ordered.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 120.

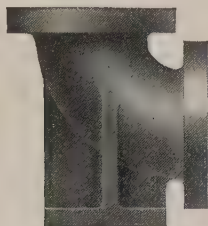
For dimensions, see page 401 to 404.

For drilling template, see page 408.

For description, see page 22.

CAST IRON FLANGED BASE ELBOWS

125 POUNDS WORKING STEAM PRESSURE



Base Elbow
Fig. 227

PRICE LIST

Base Elbows				Base Elbows			
Size Inches	Faced Ex- cept Base Each	Faced and Drilled Ex- cept Base Each	Extra for Facing and Drilling Base Each	Size Inches	Faced Ex- cept Base Each	Faced and Drilled Ex- cept Base Each	Extra for Facing and Drilling Base Each
4	\$ 9.00	\$10.00	Prices on Application	12	\$ 56.00	\$ 59.00	Prices on Application
4½	11.00	12.00		14	70.00	73.75	
5	12.50	13.50		15	80.00	84.50	
6	15.25	16.55		16	90.00	95.00	
7	21.00	22.50		18	105.00	111.00	
8	24.00	25.60		20	120.00	127.00	
9	34.00	36.25		22	150.00	159.00	
10	38.00	40.70		24	190.00	200.00	

Bases can be made square or round. Square bases will be furnished unless otherwise ordered.

Diameter and drilling of round bases correspond with standard flanges.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

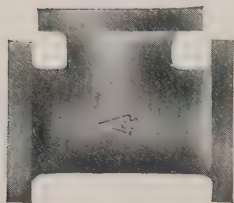
For drilling template, see page 408.

For dimensions, see page 537.

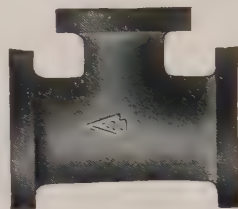
For description, see page 22.

CAST IRON FLANGED TEES

125 POUNDS WORKING STEAM PRESSURE



Standard Tee
Fig. 219



Reducing Tee
Fig. 220

PRICE LIST

Standard Tees			Reducing Tees		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$ 4.35	\$ 5.25	1¼	\$ 5.00	\$ 5.90
1½	4.35	5.25	1½	5.00	5.90
2	4.35	5.25	2	5.25	6.15
2½	4.55	5.45	2½	5.75	6.85
3	5.00	6.10	3	6.75	8.00
3½	5.85	7.10	3½	7.50	9.00
4	6.50	8.00	4	9.25	10.75
4½	8.00	9.50	4½	10.50	12.00
5	9.10	10.60	5	12.65	14.60
6	11.00	12.95	6	17.50	19.75
7	15.25	17.50	7	20.00	22.40
8	17.40	19.80	8	28.50	31.85
9	24.65	28.00	9	31.50	35.50
10	27.50	31.50	10	46.50	51.00
12	40.50	45.00	12	69.00	74.50
14	60.00	65.50	14	78.00	84.75
15	68.00	74.75	15	91.00	98.50
16	79.00	86.50	16	118.00	127.00
18	103.00	112.00	18	150.00	160.00
20	130.00	140.00	20	189.00	202.00
22	164.00	177.00	22	233.00	248.00
24	203.00	218.00	24		

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 123.

For dimensions, see page 401 to 404.

For drilling template, see page 408.

For description, see page 22.

CAST IRON FLANGED SIDE OUTLET TEES

125 POUNDS WORKING STEAM PRESSURE



**Flanged Side Outlet Tee
Fig. 2007**



**Flanged Side Outlet
Reducing Tee
Fig. 2008**

PRICE LIST—Fig. 2007

Size.....inches	4	5	6	7	8	10	12	14	16
Faced.....each	\$31.00	\$35.00	\$42.25	\$49.50	\$56.75	\$84.50	\$114.00	\$142.50	\$170.00
Faced and drilled.....each	33.00	37.00	45.00	52.50	60.00	90.00	120.00	150.00	180.00

PRICE LIST—Fig. 2008

Size.....inches	4	5	6	7	8	10	12	14	16
Faced.....each	\$34.00	\$39.00	\$47.25	\$55.00	\$62.75	\$94.50	\$126.00	\$157.50	\$190.00
Faced and drilled.....each	36.00	41.00	50.00	58.00	66.00	100.00	132.00	165.00	200.00

Larger sizes made to order. Prices on application.

Furnished faced only unless otherwise ordered.

For dimensions, see page 401 to 404.

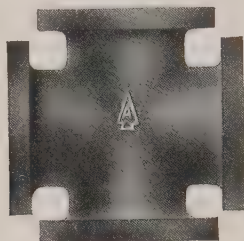
For drilling template, see page 408.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 120.

For description, see page 22.

CAST IRON FLANGED CROSSES

125 POUNDS WORKING STEAM PRESSURE



Cross
Fig. 221

PRICE LIST

Standard Crosses			Reducing Crosses		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$6.75	\$7.95	1¼	.....	.....
1½	6.75	7.95	1½	.....	.....
2	6.75	7.95	2	\$7.75	\$8.95
2½	6.95	8.15	2½	8.00	9.20
3	7.65	9.05	3	8.75	10.15
3½	9.00	10.70	3½	10.35	12.05
4	10.00	12.00	4	11.50	13.50
4½	12.00	14.00	4½	13.75	15.75
5	13.75	15.75	5	15.75	17.75
6	16.75	19.25	6	19.25	21.75
7	23.00	26.00	7	26.50	29.50
8	26.50	29.75	8	30.50	33.75
9	37.50	42.00	9	43.00	47.50
10	42.00	47.50	10	48.00	53.50
12	61.50	67.50	12	71.00	77.00
14	91.00	98.50	14	105.00	112.50
15	103.00	112.00	15	118.00	127.00
16	120.00	130.00	16	138.00	148.00
18	157.00	169.00	18	180.00	192.00
20	198.00	212.00	20	228.00	242.00
22	248.00	266.00	22	285.00	303.00
24	310.00	330.00	24	355.00	375.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors see page 120.

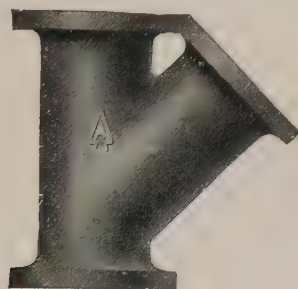
For dimensions, see pages 401 to 404.

For drilling template, see page 408.

For description, see page 22.

CAST IRON FLANGED LATERALS

125 POUNDS WORKING STEAM PRESSURE



Lateral
Fig. 225

PRICE LIST

Standard Laterals			Reducing Laterals		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$6.75	\$7.95	....	.....	.....
1½	6.75	7.95	....	.....	.....
2	6.75	7.95	2	\$7.75	\$8.95
2½	6.95	8.15	2½	8.00	9.20
3	7.65	9.05	3	8.75	10.15
3½	9.00	10.70	3½	10.35	12.05
4	10.00	12.00	4	11.50	13.50
4½	12.00	14.00	4½	13.75	15.75
5	13.75	15.75	5	15.75	17.75
6	16.75	19.25	6	19.25	21.75
7	23.00	26.00	7	26.50	29.50
8	26.50	29.75	8	30.50	33.75
9	37.50	42.00	9	43.00	47.50
10	42.00	47.50	10	48.00	53.50
12	61.50	67.50	12	71.00	77.00
14	91.00	98.50	14	105.00	112.50
15	103.00	112.00	15	118.00	127.00
16	120.00	130.00	16	138.00	148.00
18	157.00	169.00	18	180.00	192.00
20	198.00	212.00	20	228.00	242.00
22	248.00	266.00	22	285.00	303.00
24	310.00	330.00	24	355.00	375.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

For drilling template, see page 408.

For dimensions, see pages 401 and 402.

For description, see page 22.

CAST IRON FLANGED REDUCERS

125 POUNDS WORKING STEAM PRESSURE

Flanged Taper Reducers
Fig. 253Flanged Eccentric Taper Reducers
Fig. 254*Prices on Application.*

PRICE LIST

Size Inches	Diameter of Flanges Inches	Face to Face Inches	Fig. 253		Size Inches	Diameter of Flanges Inches	Face to Face Inches	Fig. 253	
			Faced Each	Faced and Drilled Each				Faced Each	Faced and Drilled Each
3 x 2	7½ x 6	6	\$6.90	\$7.60	14 x 6	21 x 11	16	\$70.00	\$73.75
3½ x 2½	8½ x 7	6½	8.10	8.95	14 x 8	21 x 13½	16	70.00	73.75
4 x 2	9 x 6	7	9.00	10.00	14 x 10	21 x 16	16	70.00	73.75
4 x 2½	9 x 7	7	9.00	10.00	14 x 12	21 x 19	16	70.00	73.75
4 x 3	9 x 7½	7	9.00	10.00	15 x 8	22¼ x 13½	17	80.00	84.50
5 x 2	10 x 6	8	12.50	13.50	15 x 10	22¼ x 16	17	80.00	84.50
5 x 2½	10 x 7	8	12.50	13.50	15 x 12	22¼ x 19	17	80.00	84.50
5 x 3	10 x 7½	8	12.50	13.50	15 x 14	22¼ x 21	17	80.00	84.50
5 x 4	10 x 9	8	12.50	13.50	16 x 8	23½ x 13½	18	90.00	95.00
6 x 3	11 x 7½	9	15.25	16.55	16 x 10	23½ x 16	18	90.00	95.00
6 x 3½	11 x 8½	9	15.25	16.55	16 x 12	23½ x 19	18	90.00	95.00
6 x 4	11 x 9	9	15.25	16.55	16 x 14	23½ x 21	18	90.00	95.00
6 x 5	11 x 10	9	15.25	16.55	18 x 10	25 x 16	19	105.00	111.00
7 x 3	12½ x 7½	10	21.00	22.50	18 x 12	25 x 19	19	105.00	111.00
7 x 4	12½ x 9	10	21.00	22.50	18 x 14	25 x 21	19	105.00	111.00
7 x 5	12½ x 10	10	21.00	22.50	18 x 16	25 x 23½	19	105.00	111.00
7 x 6	12½ x 11	10	21.00	22.50	20 x 12	27½ x 19	20	120.00	127.00
8 x 3	13½ x 7½	11	24.00	25.60	20 x 14	27½ x 21	20	120.00	127.00
8 x 4	13½ x 9	11	24.00	25.60	20 x 16	27½ x 23½	20	120.00	127.00
8 x 5	13½ x 10	11	24.00	25.60	20 x 18	27½ x 25	20	120.00	127.00
8 x 6	13½ x 11	11	24.00	25.60	22 x 14	29½ x 21	22	150.00	159.00
10 x 4	16 x 9	12	38.00	40.70	22 x 16	29½ x 23½	22	150.00	159.00
10 x 5	16 x 10	12	38.00	40.70	22 x 18	29½ x 25	22	150.00	159.00
10 x 6	16 x 11	12	38.00	40.70	22 x 20	29½ x 27½	22	150.00	159.00
10 x 8	16 x 13½	12	38.00	40.70	24 x 16	32 x 23½	24	190.00	200.00
12 x 5	19 x 10	14	56.00	59.00	24 x 18	32 x 25	24	190.00	200.00
12 x 6	19 x 11	14	56.00	59.00	24 x 20	32 x 27½	24	190.00	200.00
14 x 8	19 x 13½	14	56.00	59.00	24 x 22	32 x 29½	24	190.00	200.00
12 x 10	19 x 16	14	56.00	59.00	.....	.....	..	.....	.....

Flanged Taper Reducers of any other dimensions, will be made to order at a special price.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 120.

For drilling template, see page 408.

For dimensions, see page 405.

STANDARD CAST IRON BLIND FLANGES

125 POUNDS WORKING STEAM PRESSURE

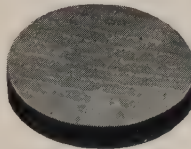


Fig. 2009

PRICE LIST

Size of Valve or Fitting and O. D. of Flange Inches	Faced Each	Faced and Drilled Each	Size of Valve or Fitting and O. D. of Flange Inches	Faced Each	Faced and Drilled Each
1 x 4	....	....	12 x 19	\$ 9.75	\$10.90
1 ¼ x 4 ½	....	....	14 x 21	13.50	14.85
1 ½ x 5	....	....	15 x 22 ¼	17.00	18.70
2 x 6	\$1.15	\$1.40	16 x 23 ½	20.00	21.80
2 ½ x 7	1.30	1.55	18 x 25	24.00	26.00
3 x 7 ½	1.40	1.70	20 x 27 ½	28.00	30.50
3 ½ x 8 ½	1.80	2.15	22 x 29 ½	33.00	36.00
4 x 9	2.00	2.45	24 x 32	40.00	43.50
4 ½ x 9 ¼	2.20	2.65	26 x 34 ¼	.....	.....
5 x 10	2.40	2.85	28 x 36 ½	.....	.....
6 x 11	3.00	3.50	30 x 38 ¾	.....	.....
7 x 12 ½	4.00	4.60	32 x 41 ¾	.....	.....
8 x 13 ½	4.60	5.30	34 x 43 ¾	.....	.....
9 x 15	5.75	6.55	36 x 46	.....	.....
10 x 16	6.75	7.75	.....	.....	.....

Furnished smooth face and not drilled, unless otherwise specified.
For drilling template, see page 408.

STANDARD CAST IRON SCREWED
FITTINGS

PRICE LIST

Size Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Elbows	.05	.05	.06	.08	.10½	.16	.20	.28	.50	.75	1.05	1.20	1.75	2.00	2.75	4.70	6.75	9.00	13.50	20.00
Elbows R. & L.	.06	.06	.07	.09	.12	.18	.23	.32	.60	.85										
Elbows Reducing		.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.00	2.30	3.15	5.40	7.75	10.50	15.50	23.00
Elbows 45°	.06	.06	.07	.10	.12	.19	.24	.34	.60	.90	1.25	1.45	2.20	2.50	3.45	5.90	8.50	11.25	17.00	25.00
Elbows Side Outlets			.18	.24	.30	.48	.60	.84	1.50	2.25	3.15	3.60	5.25	6.00	8.2					
Tees	.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	2.55	3.00	4.00	6.80	9.75	13.00	19.50	29.00
Tees Reducing		.09	.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	2.95	3.50	4.60	7.80	11.25	15.00	22.50	33.50
Tees Side Outlet			.27	.36	.45	.70	.90	1.25	2.25	3.25	4.50	5.25	7.65	9.00	12.00					
Crosses			.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	4.60	5.50	7.25	12.25	17.50	23.50	35.00	52.50
Crosses Reducing			.18	.25	.30	.46	.60	.83	1.45	2.20	3.00	3.50	5.10	6.00	8.00	13.50	19.25	26.00	38.50	58.00
Bushings		.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.75	.93	1.25	1.87	2.75	3.25	3.75	5.00
Plugs	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.65	.88	1.20	1.85	2.75	3.25	3.75	5.00
Caps		.03	.03	.05	.08	.14	.20	.26	.40	.54	.75	.87	1.05	1.20	1.55	2.50	2.85	4.75	5.50	7.00
Reducers		.06	.09	.10	.16	.22	.28	.43	.60	.80	1.00	1.35	1.85	2.00	2.70	5.35	6.75	8.35	10.00	15.00
Lock Nuts								.25	.27	.34	.47	.64	.85	.90	1.30	1.70	2.35	2.70	3.00	4.00
Y Branches	.20	.20	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	5.90	7.00	9.20	15.60	22.50	30.00	45.00	67.00
Y Branches Reducing	.23	.23	.23	.33	.40	.62	.76	1.08	1.90	2.90	4.00	4.60	6.80	8.00	10.60	18.00	26.00	35.00	51.75	77.00
Return Bends Close		.17	.18	.20	.22	.28	.40	.57	1.20	1.70										
Return Bends Open			.25	.26	.30	.40	.55	.80	1.35	2.20										
Return Bends B. Outlet				.38	.42	.60	.80	1.15	2.00	3.00										
Return Bends S. Outlet				.42	.48	.65	.90	1.40	2.25	3.50										

Galvanized Fittings at double the above lists.

The above lists apply only to what are considered "stock sizes". Other sizes are special.

STOCK LIST OF CAST IRON FLANGED
FITTINGS

STANDARD CAST IRON REDUCING FLANGED TEES

2½ x 2½ x 2	5 x 3 x 5	7 x 3 x 7	10 x 10 x 8	12 x 8 x 8
2½ x 2½ x 1½	5 x 2½ x 5	7 x 6 x 6	10 x 10 x 7	12 x 8 x 6
2½ x 2 x 1½	5 x 2 x 5	7 x 6 x 5	10 x 10 x 6	12 x 6 x 8
3 x 3 x 2½	5 x 4 x 4	6 x 6 x 7	10 x 10 x 5	10 x 10 x 12
3 x 3 x 2	5 x 4 x 3	5 x 5 x 7	10 x 10 x 4½	8 x 8 x 12
3 x 3 x 1½	5 x 4 x 2½	8 x 8 x 7	10 x 10 x 4	14 x 14 x 12
3 x 3 x 1¼	5 x 4 x 2	8 x 8 x 6	10 x 10 x 3½	14 x 14 x 10
3 x 2½ x 3	5 x 3½ x 4	8 x 8 x 5	10 x 10 x 3	14 x 14 x 8
3 x 2½ x 2½	5 x 3 x 3½	8 x 8 x 4½	10 x 10 x 2½	14 x 14 x 7
3 x 2½ x 2	5 x 3 x 3	8 x 8 x 4	10 x 10 x 2	14 x 14 x 6
3 x 2 x 2½	4 x 4 x 5	8 x 8 x 3½	10 x 8 x 10	14 x 14 x 5
3 x 2 x 3	6 x 6 x 5	8 x 8 x 3	10 x 7 x 10	14 x 12 x 14
2½ x 2½ x 3	6 x 6 x 4½	8 x 8 x 2½	10 x 6 x 10	14 x 12 x 12
3½ x 3½ x 3	6 x 6 x 4	8 x 8 x 2	10 x 5 x 10	14 x 10 x 10
3½ x 3½ x 2½	6 x 6 x 3½	8 x 7 x 8	10 x 4 x 10	10 x 10 x 14
3½ x 3½ x 2	6 x 6 x 3	8 x 6 x 8	10 x 3 x 10	16 x 16 x 14
3½ x 2½ x 2½	6 x 6 x 2½	8 x 5 x 8	10 x 8 x 8	16 x 16 x 12
4 x 4 x 3½	6 x 6 x 2	8 x 4 x 8	10 x 8 x 7	16 x 16 x 10
4 x 4 x 3	6 x 6 x 1½	8 x 3½ x 8	10 x 8 x 6	16 x 16 x 8
4 x 4 x 2½	6 x 5 x 6	8 x 3 x 8	10 x 8 x 5	16 x 16 x 7
4 x 4 x 2	6 x 4 x 6	8 x 7 x 7	10 x 8 x 4	16 x 16 x 6
4 x 4 x 1½	6 x 3 x 6	8 x 7 x 6	10 x 7 x 7	16 x 12 x 12
4 x 4 x 1¼	6 x 2½ x 6	8 x 7 x 5	10 x 6 x 8	12 x 12 x 16
4 x 3½ x 4	6 x 2 x 6	8 x 7 x 4	10 x 6 x 6	
4 x 3 x 4	6 x 5 x 5	8 x 6 x 6	8 x 8 x 10	
4 x 2½ x 4	6 x 5 x 4	8 x 6 x 5	8 x 6 x 10	
4 x 2 x 4	6 x 5 x 3	8 x 6 x 4	6 x 6 x 10	
4 x 3 x 3	6 x 5 x 2½	8 x 6 x 3	12 x 12 x 10	
4 x 3 x 2½	6 x 4 x 5	8 x 5 x 7	12 x 12 x 9	
4 x 3 x 2	6 x 4 x 4	8 x 5 x 6	12 x 12 x 8	
4 x 2½ x 3	6 x 4 x 3	8 x 5 x 5	12 x 12 x 7	
4 x 2½ x 2½	6 x 4 x 2½	8 x 4 x 6	12 x 12 x 6	
4 x 2 x 2	5 x 5 x 6	8 x 4 x 4	12 x 12 x 5	
3 x 3 x 4	5 x 4 x 6	7 x 7 x 8	12 x 12 x 4½	
4½ x 4½ x 4	4 x 4 x 6	6 x 6 x 8	12 x 12 x 4	
4½ x 4½ x 3	7 x 7 x 6	5 x 5 x 8	12 x 12 x 3	
4½ x 4½ x 2½	7 x 7 x 5	9 x 9 x 8	12 x 12 x 2	
5 x 5 x 4	7 x 7 x 4	9 x 9 x 7	12 x 10 x 12	
5 x 5 x 3½	7 x 7 x 3½	9 x 9 x 6	12 x 8 x 12	
5 x 5 x 3	7 x 7 x 3	9 x 9 x 5	12 x 6 x 12	
5 x 5 x 2½	7 x 7 x 2½	9 x 9 x 4	12 x 4 x 12	
5 x 5 x 2	7 x 7 x 2	9 x 9 x 3	12 x 10 x 10	
5 x 5 x 1½	7 x 6 x 7	9 x 9 x 2½	12 x 10 x 8	
5 x 5 x 1¼	7 x 5 x 7	9 x 6 x 6	12 x 10 x 6	
5 x 4 x 5	7 x 4 x 7	10 x 10 x 9	12 x 8 x 10	

STOCK LIST OF CAST IRON FLANGED FITTINGS

EXTRA HEAVY CAST IRON REDUCING FLANGED TEES

2½ x 2½ x 2	3 x 3 x 4	6 x 5 x 4	8 x 7 x 6	12 x 12 x 10
2½ x 2½ x 1½	2½ x 2½ x 4	6 x 5 x 3	8 x 7 x 5	12 x 12 x 9
2½ x 2½ x 1¼	4½ x 4½ x 3	6 x 5 x 2½	8 x 6 x 7	12 x 12 x 8
2½ x 2 x 2	4½ x 4½ x 2	6 x 5 x 2	8 x 6 x 6	12 x 12 x 7
3 x 3 x 2½	4½ x 4 x 4½	6 x 4 x 5	8 x 6 x 5	12 x 12 x 6
3 x 3 x 2	5 x 5 x 4	6 x 4 x 4	8 x 6 x 4	12 x 12 x 5
3 x 3 x 1½	5 x 5 x 3½	6 x 4 x 3	8 x 5 x 6	12 x 12 x 4
3 x 3 x 1¼	5 x 5 x 3	6 x 3 x 3	8 x 5 x 5	12 x 12 x 3
3 x 3 x 1	5 x 5 x 2½	5 x 5 x 6	8 x 4 x 6	12 x 12 x 2½
3 x 2½ x 3	5 x 5 x 2	4½ x 4½ x 6	8 x 4 x 4	12 x 10 x 12
3 x 2 x 3	5 x 5 x 1½	4 x 4 x 6	6 x 6 x 8	12 x 8 x 12
3 x 1½ x 3	5 x 4 x 5	7 x 7 x 6	5 x 5 x 8	12 x 10 x 10
3 x 1¼ x 3	5 x 3 x 5	7 x 7 x 5	9 x 9 x 6	12 x 10 x 8
3 x 2½ x 2½	5 x 2½ x 5	7 x 7 x 4	9 x 9 x 5	12 x 10 x 6
3 x 2 x 2	5 x 4 x 4	7 x 7 x 3	10 x 10 x 8	12 x 8 x 8
2 x 2 x 3	5 x 4 x 3	7 x 7 x 2	10 x 10 x 7	12 x 8 x 6
3½ x 3½ x 2½	5 x 4 x 2½	7 x 6 x 7	10 x 10 x 6	10 x 10 x 12
3½ x 3½ x 2	5 x 3 x 4	7 x 6 x 6	10 x 10 x 5	8 x 8 x 12
3½ x 2½ x 3½	5 x 3 x 3	7 x 5 x 5	10 x 10 x 4½	14 x 14 x 12
4 x 4 x 3½	4 x 4 x 5	6 x 6 x 7	10 x 10 x 4	14 x 14 x 10
4 x 4 x 3	6 x 6 x 5	8 x 8 x 7	10 x 10 x 3½	14 x 14 x 8
4 x 4 x 2½	6 x 6 x 4½	8 x 8 x 6	10 x 10 x 3	14 x 14 x 7
4 x 4 x 2	6 x 6 x 4	8 x 8 x 5	10 x 10 x 2	14 x 14 x 6
4 x 4 x 1½	6 x 6 x 3½	8 x 8 x 4½	10 x 8 x 10	14 x 14 x 5
4 x 3 x 4	6 x 6 x 3	8 x 8 x 4	10 x 6 x 10	14 x 12 x 8
4 x 2½ x 4	6 x 6 x 2½	8 x 8 x 3½	10 x 8 x 8	16 x 16 x 10
4 x 2 x 4	6 x 6 x 2	8 x 8 x 3	10 x 8 x 6	16 x 16 x 8
4 x 3 x 3	6 x 5 x 6	8 x 8 x 2½	10 x 8 x 5	16 x 16 x 7
4 x 3 x 2	6 x 4 x 6	8 x 8 x 2	10 x 6 x 8	16 x 16 x 6
4 x 3 x 1½	6 x 3 x 6	8 x 6 x 8	10 x 6 x 6	
4 x 2½ x 2½	6 x 2½ x 6	8 x 4 x 8	8 x 8 x 10	
4 x 2 x 3	6 x 5 x 5	8 x 3 x 8	7 x 7 x 10	

STANDARD CAST IRON REDUCING FLANGED CROSSES

4 x 4 x 3 x 3	6 x 6 x 5 x 5	8 x 8 x 5 x 5	8 x 6 x 8 x 6	
5 x 5 x 4 x 4	6 x 6 x 4 x 4	8 x 8 x 4 x 4	10 x 10 x 8 x 8	
5 x 5 x 3 x 3	6 x 6 x 3 x 3	8 x 8 x 3 x 3	10 x 10 x 6 x 6	
5 x 5 x 2½ x 2½	8 x 8 x 6 x 6	8 x 6 x 6 x 6	10 x 10 x 5 x 5	

STANDARD CAST IRON REDUCING FLANGED LATERALS

4 x 4 x 2½	6 x 6 x 3	8 x 8 x 6	8 x 8 x 3	10 x 10 x 6
6 x 6 x 4	6 x 6 x 2½	8 x 6 x 6	10 x 10 x 8	10 x 8 x 8

STOCK LIST OF CAST IRON FLANGED FITTINGS

STANDARD CAST IRON FLANGED REDUCING TAPER ELBOWS

3 x 1½	4½ x 3½	7 x 6	10 x 7	16 x 12
3 x 2	4½ x 4	8 x 3½	10 x 8	16 x 14
3 x 2½	5 x 2½	8 x 4	10 x 9	16 x 15
3½ x 2	5 x 3	8 x 5	12 x 6	18 x 15
3½ x 2½	5 x 4	8 x 6	12 x 7	18 x 16
3½ x 3	6 x 2½	8 x 7	12 x 8	20 x 14
4 x 2	6 x 3	9 x 6	12 x 10	20 x 16
4 x 2½	6 x 3½	9 x 8	14 x 10	20 x 18
4 x 3	6 x 4	10 x 4½	14 x 12	
4 x 3½	6 x 5	10 x 5	15 x 10	
4½ x 2½	7 x 5	10 x 6	15 x 12	

EXTRA HEAVY CAST IRON REDUCING FLANGED CROSSES

3 x 3 x 2½ x 2½	6 x 6 x 4 x 4	8 x 8 x 6 x 6	8 x 8 x 4 x 4
4 x 4 x 2½ x 2½	6 x 6 x 3 x 3	8 x 8 x 5 x 5	

EXTRA HEAVY CAST IRON REDUCING FLANGED LATERALS

4 x 4 x 2½	6 x 6 x 2½
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EXTRA HEAVY CAST IRON FLANGED REDUCING TAPER ELBOWS

2 x 1¼	4 x 2	6 x 4½	10 x 6	15 x 6
2 x 1½	4 x 2½	6 x 5	10 x 7	15 x 10
2½ x 1½	4 x 3	7 x 4	10 x 8	15 x 12
2½ x 2	4 x 3½	7 x 5	12 x 7	16 x 8
3 x 1½	5 x 2½	7 x 6	12 x 8	16 x 10
3 x 2	5 x 3	8 x 4	12 x 9	16 x 12
3 x 2½	5 x 4	8 x 5	12 x 10	16 x 14
3½ x 2	6 x 3	8 x 6	14 x 6	
3½ x 2½	6 x 3½	8 x 7	14 x 10	
3½ x 3	6 x 4	10 x 5	14 x 12	

STANDARD CAST IRON COMPANION FLANGES

1 x 4	3 x 7½	6 x 11	12 x 19	18 x 25
1¼ x 4½	3½ x 8½	7 x 12½	14 x 21	20 x 27½
1½ x 5	4 x 9	8 x 13½	15 x 21	22 x 29½
2 x 6	4½ x 9¼	9 x 15	15 x 22¼	24 x 32
2½ x 7	5 x 10	10 x 16	16 x 23½	

STANDARD CAST IRON BLIND FLANGES

1 x 4	3½ x 8½	8 x 13½	16 x 23½	28 x 36½
1¼ x 4½	4 x 9	9 x 15	18 x 25	30 x 38¾
1½ x 5	4½ x 9¼	10 x 16	20 x 27½	32 x 41¾
2 x 6	5 x 10	12 x 19	22 x 29½	34 x 43¾
2½ x 7	6 x 11	14 x 21	24 x 32	36 x 46
3 x 7½	7 x 12½	15 x 22¼	26 x 34¼	

STOCK LIST OF CAST IRON FLANGED FITTINGS

STANDARD CAST IRON REDUCING COMPANION FLANGES

1 x 6	4 x 9 $\frac{1}{4}$	2 x 13 $\frac{1}{2}$	9 x 16	12 x 25
1 $\frac{1}{4}$ x 6	2 x 10	2 $\frac{1}{2}$ x 13 $\frac{1}{2}$	6 x 19	14 x 25
1 $\frac{1}{2}$ x 6	2 $\frac{1}{2}$ x 10	3 x 13 $\frac{1}{2}$	7 x 19	15 x 25
1 $\frac{1}{2}$ x 7	3 x 10	4 x 13 $\frac{1}{2}$	8 x 19	16 x 25
2 x 7	3 $\frac{1}{2}$ x 10	5 x 13 $\frac{1}{2}$	9 x 19	14 x 27 $\frac{1}{2}$
1 $\frac{1}{2}$ x 7 $\frac{1}{2}$	4 x 10	6 x 13 $\frac{1}{2}$	10 x 19	15 x 27 $\frac{1}{2}$
2 x 7 $\frac{1}{2}$	4 $\frac{1}{2}$ x 10	7 x 13 $\frac{1}{2}$	8 x 21	16 x 27 $\frac{1}{2}$
2 $\frac{1}{2}$ x 7 $\frac{1}{2}$	2 x 11	6 x 15	9 x 21	18 x 27 $\frac{1}{2}$
2 x 8 $\frac{1}{2}$	2 $\frac{1}{2}$ x 11	7 x 15	10 x 21	15 x 29 $\frac{1}{2}$
2 $\frac{1}{2}$ x 8 $\frac{1}{2}$	3 x 11	8 x 15	12 x 21	16 x 29 $\frac{1}{2}$
3 x 8 $\frac{1}{2}$	3 $\frac{1}{2}$ x 11	2 $\frac{1}{2}$ x 16	8 x 22 $\frac{1}{4}$	18 x 29 $\frac{1}{2}$
2 x 9	4 x 11	3 x 16	10 x 22 $\frac{1}{4}$	20 x 29 $\frac{1}{2}$
2 $\frac{1}{2}$ x 9	4 $\frac{1}{2}$ x 11	3 $\frac{1}{2}$ x 16	12 x 22 $\frac{1}{4}$	14 x 32
3 x 9	5 x 11	4 x 16	14 x 22 $\frac{1}{4}$	16 x 32
3 $\frac{1}{2}$ x 9	4 x 12 $\frac{1}{2}$	5 x 16	10 x 23 $\frac{1}{2}$	18 x 32
2 $\frac{1}{2}$ x 9 $\frac{1}{4}$	4 $\frac{1}{2}$ x 12 $\frac{1}{2}$	6 x 16	12 x 23 $\frac{1}{2}$	20 x 32
3 x 9 $\frac{1}{4}$	5 x 12 $\frac{1}{2}$	7 x 16	14 x 23 $\frac{1}{2}$	
3 $\frac{1}{2}$ x 9 $\frac{1}{4}$	6 x 12 $\frac{1}{2}$	8 x 16	15 x 23 $\frac{1}{2}$	

EXTRA HEAVY CAST IRON COMPANION FLANGES

1 x 4 $\frac{1}{2}$	3 x 8 $\frac{1}{4}$	6 x 12 $\frac{1}{2}$	12 x 20 $\frac{1}{2}$	20 x 30 $\frac{1}{2}$
1 $\frac{1}{4}$ x 5	3 $\frac{1}{2}$ x 9	7 x 14	14 x 23	22 x 33
1 $\frac{1}{2}$ x 6	4 x 10	8 x 15	15 x 24 $\frac{1}{2}$	24 x 36
2 x 6 $\frac{1}{2}$	4 $\frac{1}{2}$ x 10 $\frac{1}{2}$	9 x 16 $\frac{1}{4}$	16 x 25 $\frac{1}{2}$	
2 $\frac{1}{2}$ x 7 $\frac{1}{2}$	5 x 11	10 x 17 $\frac{1}{2}$	18 x 28	

EXTRA HEAVY CAST IRON BLIND FLANGES

1 $\frac{1}{2}$ x 6	4 x 10	8 x 15	15 x 24 $\frac{1}{2}$	24 x 36
2 x 6 $\frac{1}{2}$	4 $\frac{1}{2}$ x 10 $\frac{1}{2}$	9 x 16 $\frac{1}{4}$	16 x 25 $\frac{1}{2}$	
2 $\frac{1}{2}$ x 7 $\frac{1}{2}$	5 x 11	10 x 17 $\frac{1}{2}$	18 x 28	
3 x 8 $\frac{1}{4}$	6 x 12 $\frac{1}{2}$	12 x 20 $\frac{1}{2}$	20 x 30 $\frac{1}{2}$	
3 $\frac{1}{2}$ x 9	7 x 14	14 x 23	22 x 33	

EXTRA HEAVY CAST IRON REDUCING COMPANION FLANGES

1 $\frac{1}{4}$ x 6	3 x 10 $\frac{1}{2}$	5 x 14	8 x 17 $\frac{1}{2}$	12 x 25 $\frac{1}{2}$
1 $\frac{1}{2}$ x 6 $\frac{1}{2}$	3 $\frac{1}{2}$ x 10 $\frac{1}{2}$	6 x 14	9 x 17 $\frac{1}{2}$	14 x 25 $\frac{1}{2}$
1 $\frac{1}{2}$ x 7 $\frac{1}{2}$	4 x 10 $\frac{1}{2}$	3 x 15	6 x 20 $\frac{1}{2}$	15 x 25 $\frac{1}{2}$
2 x 7 $\frac{1}{2}$	2 x 11	3 $\frac{1}{2}$ x 15	7 x 20 $\frac{1}{2}$	12 x 28
1 $\frac{1}{2}$ x 8 $\frac{1}{4}$	2 $\frac{1}{2}$ x 11	4 x 15	8 x 20 $\frac{1}{2}$	14 x 28
2 x 8 $\frac{1}{4}$	3 x 11	5 x 15	9 x 20 $\frac{1}{2}$	15 x 28
2 $\frac{1}{2}$ x 8 $\frac{1}{4}$	3 $\frac{1}{2}$ x 11	6 x 15	10 x 20 $\frac{1}{2}$	16 x 28
2 x 9	4 x 11	7 x 15	8 x 23	14 x 30 $\frac{1}{2}$
2 $\frac{1}{2}$ x 9	4 $\frac{1}{2}$ x 11	4 x 16 $\frac{1}{4}$	9 x 23	15 x 30 $\frac{1}{2}$
3 x 9	2 x 12 $\frac{1}{2}$	5 x 16 $\frac{1}{4}$	10 x 23	16 x 30 $\frac{1}{2}$
2 x 10	2 $\frac{1}{2}$ x 12 $\frac{1}{2}$	6 x 16 $\frac{1}{4}$	12 x 23	18 x 30 $\frac{1}{2}$
2 $\frac{1}{2}$ x 10	3 x 12 $\frac{1}{2}$	7 x 16 $\frac{1}{4}$	8 x 24 $\frac{1}{2}$	16 x 33
3 x 10	4 x 12 $\frac{1}{2}$	8 x 16 $\frac{1}{4}$	10 x 24 $\frac{1}{2}$	18 x 33
3 $\frac{1}{2}$ x 10	4 $\frac{1}{2}$ x 12 $\frac{1}{2}$	5 x 17 $\frac{1}{2}$	12 x 24 $\frac{1}{2}$	20 x 33
2 x 10 $\frac{1}{2}$	5 x 12 $\frac{1}{2}$	6 x 17 $\frac{1}{2}$	14 x 24 $\frac{1}{2}$	18 x 36
2 $\frac{1}{2}$ x 10 $\frac{1}{2}$	4 $\frac{1}{2}$ x 14	7 x 17 $\frac{1}{2}$	10 x 25 $\frac{1}{2}$	20 x 36

STANDARD SCREWED FLANGES

125 POUNDS WORKING STEAM PRESSURE

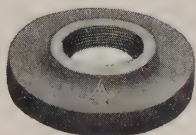


Fig. 228

PRICE LIST

Size Inches	Cast Iron		Cast Iron Flange Including Bolts and Labor Bolting Price	Cast Steel		Forged Steel		Threading Pipe and Making On Not Including Flange Net Each
	Faced Each	Faced and Drilled Each		Faced Each	Faced Drilled and Spot Faced Each *	Faced Each	Faced and Drilled Each	
1 x 4	\$0.55	\$0.80	\$ 1.45	\$ 5.00	\$ 6.50	.....	.....	\$0.40
1¼ x 4½	.60	.85	1.50	5.40	7.00	.....	.....	.40
1½ x 5	.65	.90	1.55	5.90	7.50	.....	.....	.45
2 x 6	.75	1.00	1.75	6.90	8.50	\$10.40	\$11.00	.50
2½ x 7	.85	1.10	1.92	7.30	9.50	11.80	13.00	.55
3 x 7½	.95	1.25	2.02	8.70	11.00	13.70	15.00	.60
3½ x 8½	1.20	1.55	2.37	12.10	14.50	17.60	19.00	.65
4 x 9	1.35	1.80	3.10	14.80	18.50	18.30	20.00	.70
4½ x 9¼	1.45	1.90	3.75	15.80	19.50	20.30	22.00	.75
5 x 10	1.60	2.05	3.90	16.80	20.50	22.30	24.00	.85
6 x 11	2.00	2.50	4.35	20.40	24.00	25.40	27.00	1.00
7 x 12½	2.65	3.25	5.10	24.70	29.50	27.20	32.00	1.10
8 x 13½	3.10	3.80	5.70	27.00	32.00	32.00	35.00	1.30
9 x 15	3.85	4.65	7.50	29.50	35.50	37.00	40.00	1.55
10 x 16	4.50	5.50	9.10	34.50	40.50	45.00	48.00	1.70
12 x 19	6.50	7.65	11.30	46.00	53.00	56.00	60.00	2.40
14 x 21	9.00	10.35	.....	55.50	63.00	75.50	80.00	3.10
15 x 22¼	11.50	13.20	.....	64.00	74.00	.....	.....	3.25
16 x 23½	13.50	15.30	.....	78.00	89.00	.....	.....	4.25
18 x 25	16.00	18.00	.....	98.00	110.00	.....	.....	6.25
20 x 27½	19.00	21.50	.....	117.00	130.00	.....	.....	7.50
22 x 29½	22.00	25.00	.....	140.00	155.00	.....	.....	8.50
24 x 32	27.00	30.50	.....	165.00	180.00	.....	.....	10.00

Bolts per set for One Joint, see price list, page 121.

*Cast Steel Flanges when ordered faced and drilled, will always be furnished with bolt holes spotfaced, at the prices listed above.

Furnished smooth faced and not drilled, unless otherwise specified.

For drilling template, see page 408.

For dimensions, see page 406.

For description, see page 43.

CAST IRON STANDARD REDUCING COMPANION FLANGES

125 POUNDS WORKING STEAM PRESSURE

PRICE LIST

Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1 x 6	\$1.30	\$1.55	8 x 15	\$ 6.35	\$ 7.15
1¼ x 6	1.30	1.55	2½ x 16	7.45	8.45
1½ x 6	1.30	1.55	3 x 16	7.45	8.45
1½ x 7	1.45	1.70	3½ x 16	7.45	8.45
2 x 7	1.45	1.70	4 x 16	7.45	8.45
1½ x 7½	1.55	1.85	5 x 16	7.45	8.45
2 x 7½	1.55	1.85	6 x 16	7.45	8.45
2½ x 7½	1.55	1.85	7 x 16	7.45	8.45
2 x 8½	2.00	2.35	8 x 16	7.45	8.45
2½ x 8½	2.00	2.35	9 x 16	7.45	8.45
3 x 8½	2.00	2.35	6 x 19	10.75	11.90
2 x 9	2.20	2.65	7 x 19	10.75	11.90
2½ x 9	2.20	2.65	8 x 19	10.75	11.90
3 x 9	2.20	2.65	9 x 19	10.75	11.90
3½ x 9	2.20	2.65	10 x 19	10.75	11.90
2½ x 9¼	2.40	2.85	8 x 21	15.00	16.35
3 x 9¼	2.40	2.85	9 x 21	15.00	16.35
3½ x 9¼	2.40	2.85	10 x 21	15.00	16.35
4 x 9¼	2.40	2.85	12 x 21	15.00	16.35
2 x 10	2.65	3.10	8 x 22¼	19.00	20.70
2½ x 10	2.65	3.10	10 x 22¼	19.00	20.70
3 x 10	2.65	3.10	12 x 22¼	19.00	20.70
3½ x 10	2.65	3.10	14 x 22¼	19.00	20.70
4 x 10	2.65	3.10	10 x 23½	22.00	23.80
4½ x 10	2.65	3.10	12 x 23½	22.00	23.80
2 x 11	3.30	3.80	14 x 23½	22.00	23.80
2½ x 11	3.30	3.80	15 x 23½	22.00	23.80
3 x 11	3.30	3.80	12 x 25	26.50	28.50
3½ x 11	3.30	3.80	14 x 25	26.50	28.50
4 x 11	3.30	3.80	15 x 25	26.50	28.50
4½ x 11	3.30	3.80	16 x 25	26.50	28.50
5 x 11	3.30	3.80	14 x 27½	31.00	33.50
4 x 12½	4.40	5.00	15 x 27½	31.00	33.50
4½ x 12½	4.40	5.00	16 x 27½	31.00	33.50
5 x 12½	4.40	5.00	18 x 27½	31.00	33.50
6 x 12½	4.40	5.00	15 x 29½	36.00	39.00
2 x 13½	5.10	5.80	16 x 29½	36.00	39.00
2½ x 13½	5.10	5.80	18 x 29½	36.00	39.00
3 x 13½	5.10	5.80	20 x 29½	36.00	39.00
4 x 13½	5.10	5.80	14 x 32	44.00	47.50
5 x 13½	5.10	5.80	16 x 32	44.00	47.50
6 x 13½	5.10	5.80	18 x 32	44.00	47.50
7 x 13½	5.10	5.80	20 x 32	44.00	47.50
6 x 15	6.35	7.15			
7 x 15	6.35	7.15			

For drilling template, see page 408.

For dimensions, see page 406.

For description, see page 43.

STANDARD FLANGE UNIONS
SCREWED—CAST IRON
125 POUNDS—AMERICAN STANDARD
PRICE LIST

Including Bolts but without Gasket

Size Inches	Price	Size Inches	Price
1	\$2.25	4½	\$ 5.65
1¼	2.35	5	5.95
1½	2.45	6	6.85
2	2.75	7	8.35
2½	3.02	8	9.50
3	3.27	9	13.25
3½	3.92	10	14.50
4	4.90	12	18.95

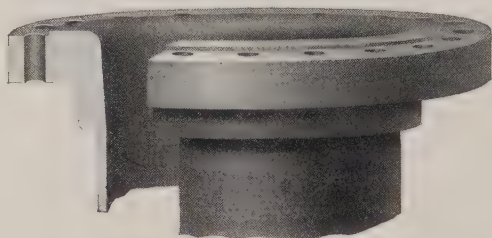
These Flange Unions are guaranteed for 125 pounds pressure and conform to the American Standard.

For dimensions, see page 406.

For drilling, see page 408.

ATWOOD LAP FLANGES

**CAST IRON HIGH HUB AND CAST STEEL LOW HUB
PRESSURE UP TO AND INCLUDING 125 POUNDS**



High Hub, Fig. 2010

PRICE LIST HIGH HUB CAST IRON FLANGES

Including Flange, Drilling thereof, Attaching and Machining Turnover.

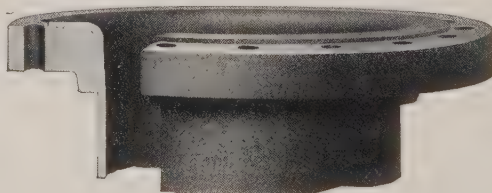
Size . . . inches	4	5	6	7	8	9	10	12
Each	\$19.00	\$21.00	\$22.00	\$26.00	\$29.00	\$32.00	\$34.00	\$40.00
Size . . . inches	14	15	16	18	20	22	24	
Each	\$45.00	\$48.00	\$53.00	\$61.00	\$70.00	\$85.00	\$100.00	

For dimensions, see page 407.

For description, see page 44.

For drilling template, see page 408.

When figuring pipe for Atwood Laps, 3 inches should be added for each flange on account of turn-over.



Low Hub, Fig. 2011

PRICE LIST Low Hub Cast Steel Flanges

Including Flange, Drilling thereof and Attaching. Laps not refaced except when ordered for live steam.

Size inches	6	7	8	9	10	12	14
Each	\$31.00	\$36.00	\$41.00	\$46.00	\$51.00	\$65.00	\$77.00
Size inches	15	16	18	20	22	24	
Each	\$89.00	\$98.00	\$116.00	\$136.00	\$156.00	\$184.00	

For dimensions, see page 406.

For description, see page 44.

For drilling template, see page 408.

When figuring pipe for Atwood Lap, 3 inches should be added for each flange on account of turn-over.

We are in a position to furnish the "Atwood Lap" with the square corner. Prices on application.

DRILLING
STANDARD AND LOW PRESSURE
FLANGED VALVES
PRICE LIST

Pipe Size Inches	Drilling Valves with Two Flanges Except Angle Valves Each	Drilling Angle Valves Each	Drilling Cross Valves Each
$\frac{3}{4}$	\$0.60	\$ 1.00	\$1.20
1	.60	1.00	1.20
$1\frac{1}{4}$	.60	1.00	1.20
$1\frac{1}{2}$	.60	1.00	1.20
2	.75	1.25	1.50
$2\frac{1}{2}$	.75	1.25	1.50
3	.75	1.25	1.50
$3\frac{1}{2}$	1.00	1.50	2.00
4	1.25	1.75	2.50
$4\frac{1}{2}$	1.50	2.00	3.00
5	1.50	2.00	3.00
6	1.75	2.50	3.50
7	2.25	3.00	4.50
8	2.25	3.00	4.50
9	2.50	3.50	5.00
10	2.50	3.50	5.00
12	3.50	5.00	7.00
14	4.00	6.00	....
15	4.50	6.50	....
16	5.00	7.00	....
18	6.00	10.00	....
20	7.50	12.00	....
22	9.00	14.00	....
24	10.00	16.00	....
26	11.00	18.00	....
28	12.00	20.00	....
30	12.00	22.00	....
32	12.00	22.00	....
34	14.00	24.00	....
36	14.00	24.00	....
42	25.00	.....	....
48	30.00	.....	....

Spotfacing bolt holes, five cents net, extra, for each hole.

ATTACHING

STANDARD COMPANION FLANGES, ETC.

EXTRA NET PRICE LIST

Size of Fitting or Valve Inches	Bolting Companion Flanges to Fittings Not Including Bolts or Gaskets For Labor Only Each Flange	Wooden Protectors Bolted on With Two Bolts Each Flange
1¼	\$0.10	\$0.20
1½	.10	.20
2	.10	.20
2½	.10	.20
3	.10	.25
3½	.10	.25
4	.10	.25
4½	.15	.25
5	.15	.25
6	.15	.25
7	.15	.30
8	.15	.30
9	.20	.30
10	.20	.35
12	.20	.35
14	.20	.40
15	.25	.40
16	.25	.45

Spotfacing bolt holes, five cents net, extra, for each hole.

The above net prices apply to both straight and reducing sizes of flanged fittings.

MACHINE BOLTS

AMERICAN STANDARD FOR 125 POUNDS

MANUFACTURERS' STANDARD BOLTS
SQUARE HEADS AND HEXAGONAL NUTS

PRICE LIST FOR ONE JOINT

For drilling template, see page 408

Pipe Size Inches	Number of Bolts	Size of Bolts Inches	Per Set Each	Pipe Size Inches	Number of Bolts	Size of Bolts Inches	Per Set Each
1	4	$\frac{7}{8} \times 1\frac{1}{2}$	\$0.14	12	12	$\frac{7}{8} \times 3\frac{3}{4}$	\$ 2.03
$1\frac{1}{4}$	4	$\frac{7}{8} \times 1\frac{3}{4}$	.15	14	12	1 x 4	2.96
$1\frac{1}{2}$	4	$\frac{1}{2} \times 2$	.19	15	16	1 x 4	3.94
2	4	$\frac{5}{8} \times 2\frac{1}{4}$	.29	16	16	1 x $4\frac{1}{4}$	3.94
$2\frac{1}{2}$	4	$\frac{5}{8} \times 2\frac{1}{4}$	.29	18	16	$1\frac{1}{8} \times 4\frac{1}{2}$	5.91
3	4	$\frac{5}{8} \times 2\frac{1}{2}$	.29	20	20	$1\frac{1}{8} \times 4\frac{3}{4}$	7.39
$3\frac{1}{2}$	4	$\frac{5}{8} \times 2\frac{1}{2}$	.29	22	20	$1\frac{1}{4} \times 5\frac{1}{4}$	10.00
4	8	$\frac{5}{8} \times 2\frac{3}{4}$	.66	24	20	$1\frac{1}{4} \times 5\frac{1}{4}$	10.00
$4\frac{1}{2}$	8	$\frac{3}{4} \times 3$	.97	26	24	$1\frac{1}{4} \times 5\frac{1}{2}$	12.42
5	8	$\frac{3}{4} \times 3$	.97	28	28	$1\frac{1}{4} \times 5\frac{3}{4}$	14.49
6	8	$\frac{3}{4} \times 3$	.97	30	28	$1\frac{3}{8} \times 6$	Prices
7	8	$\frac{3}{4} \times 3\frac{1}{4}$	.97	32	28	$1\frac{1}{2} \times 6\frac{1}{4}$	on
8	8	$\frac{3}{4} \times 3\frac{1}{4}$	.97	34	32	$1\frac{1}{2} \times 6\frac{1}{2}$	Applica-
9	12	$\frac{3}{4} \times 3\frac{1}{4}$	1.45	36	32	$1\frac{1}{2} \times 6\frac{1}{2}$	tion
10	12	$\frac{7}{8} \times 3\frac{1}{2}$	2.03	..	..	.....

Bolts for Atwood Joints are longer than shown above.

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished, add 10% to above list.

GASKETS

AMERICAN STANDARD FOR 125 POUNDS

PRICE LIST FOR ONE JOINT

Pipe Size	Ring Gasket O. D.	Ring Gasket Each	Full Gasket O. D.	Full Gasket Each
1	2 $\frac{1}{2}$	\$0.08	4	\$0.24
1 $\frac{1}{4}$	2 $\frac{7}{8}$	.11	4 $\frac{1}{2}$	.29
1 $\frac{1}{2}$	3 $\frac{3}{8}$	.14	5	.36
2	4 $\frac{1}{8}$	.20	6	.50
2 $\frac{1}{2}$	4 $\frac{7}{8}$	.28	7	.67
3	5 $\frac{3}{8}$	.31	7 $\frac{1}{2}$	.74
3 $\frac{1}{2}$	6 $\frac{3}{8}$	.47	8 $\frac{1}{2}$	.94
4	6 $\frac{7}{8}$	.49	9	1.02
4 $\frac{1}{2}$	7	.45	9 $\frac{1}{4}$	1.03
5	7 $\frac{3}{4}$	.55	10	1.18
6	8 $\frac{3}{4}$	.64	11	1.34
7	10	.80	12 $\frac{1}{2}$	1.68
8	11	.90	13 $\frac{1}{2}$	1.86
9	12 $\frac{1}{2}$	1.18	15	2.26
10	13 $\frac{3}{8}$	1.24	16	2.45
12	16 $\frac{1}{8}$	1.82	19	3.41
14	17 $\frac{3}{4}$	1.87	21	3.85
15	19	2.14	22 $\frac{1}{4}$	4.24
16	20 $\frac{1}{4}$	2.42	23 $\frac{1}{2}$	4.65
18	21 $\frac{5}{8}$	2.26	25	4.73
20	23 $\frac{7}{8}$	2.67	27 $\frac{1}{2}$	5.60
22	26	3.02	29 $\frac{1}{2}$	6.07
24	28 $\frac{1}{4}$	3.49	32	7.03
26	30 $\frac{1}{2}$	3.99	34 $\frac{1}{4}$	7.81
28	32 $\frac{3}{4}$	4.53	36 $\frac{1}{2}$	8.61
30	34 $\frac{5}{8}$	4.70	38 $\frac{3}{4}$	9.45
32	37	5.42	41 $\frac{3}{4}$	11.30
34	39	5.73	43 $\frac{3}{4}$	11.91
36	41 $\frac{1}{4}$	6.37	46	12.88
40	45 $\frac{5}{8}$	7.57	50 $\frac{3}{4}$	15.32
42	47 $\frac{7}{8}$	8.29	53	16.42
48	54 $\frac{3}{8}$	10.25	59 $\frac{1}{2}$	19.42
54	61	12.65	66 $\frac{1}{4}$	23.14

"Ring" gaskets cover the flange from inside of bolt to inside of pipe. All metallic gaskets are so furnished. Soft gaskets will be furnished "ring" unless specified "full."

**MEDIUM PRESSURE PARALLEL SEAT
GATE VALVES**

No. 3 P

200 POUNDS WORKING WATER PRESSURE

We recommend this type of valve for water at 200 pounds pressure. They have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them.

The discs for these valves are bronze for sizes 3 inch and smaller. All sizes above 3 inch are cast iron bronze mounted.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made all iron or with bronze, or special mountings.

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel when both are forced outward against their respective seats. In the smaller sizes these wedges are solid bronze, and in larger sizes cast iron bronze mounted. This bronze mounting is cast into the iron in such a way as to make it impossible for it to become detached. It is thus seen that the wedging mechanism, being non-corrosive, cannot interlock and fail to open.

Valves 12 inches and above have the discs carried on bronze rollers working in bronze bushed bearings. These rollers are placed on both edges of the discs so that the valves can be installed with either disc to the pressure.

When gearing is necessary our standard types of bevel and spur gears can be made to suit almost any condition. (See pages 532 to 536.) If special conditions exist these types can be varied.

We are prepared to furnish any desired special operating mechanism such as cylinders for air, water or steam; or motor drives. (See pages 30 to 42.)

Outside screw and yoke valves are backseated for repacking as shown in Figure 206, page 50.

Unless otherwise ordered all valves are made to open by turning the wheel or nut to the left, viz., opposite the motion of the hands of a clock.

When so ordered standard valves will be equipped with by-passes. The by-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working Pressure.

Whether screw ends, flange or hub ends.

Service—whether for steam, water, gas, etc.

Whether all iron, or iron body bronze mounted or iron.

Whether inside screw or outside screw and yoke.

Whether gearing is required; if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.



ATWOOD

MEDIUM GATE VALVES No. 3 P

SEMI-STEEL

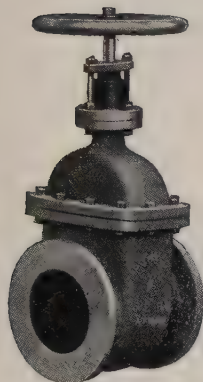
BRONZE MOUNTED. PARALLEL SEAT.
FOR WORKING WATER PRESSURE UP TO 200 POUNDS
TESTED TO 500 POUNDS PER SQUARE INCH

The minimum opening through these valves is 100 per cent of the pipe area.

Inside screw stems are bronze. Outside screw and yoke stems are steel, heavily copper-plated.

Bronze stems for outside screw and yoke valves will be furnished at an extra price.

The discs for these valves are bronze, for sizes 3 inch and smaller. All sizes above 3 inch are cast iron, bronze mounted.



Inside
Screw Valve
Fig. 324



Outside Screw and
Yoke Valve
Fig. 325

PRICE LIST

Size Inches	Inside Screw			Outside Screw and Yoke		
	Screwed Each	Flanged Each	Add for By-pass Each	Screwed Each	Flanged Each	Add for By-pass Each
2	\$ 15.00	\$ 17.50	.....	\$ 23.00	\$ 25.50	.....
2½	17.00	19.50	.....	25.00	27.50	.....
3	20.00	23.00	.....	29.00	32.00	.....
3½	25.00	28.00	.....	35.00	38.00	.....
4	28.00	33.00	.....	40.00	45.00	.....
4½	35.00	40.00	.....	50.00	55.00	.....
5	40.00	45.00	.....	54.00	59.00	.....
6	50.00	57.00	\$28.00	65.00	72.00	\$28.00
7	75.00	82.00	28.00	90.00	97.00	28.00
8	87.00	94.00	31.00	110.00	117.00	31.00
9	120.00	127.00	31.00	145.00	152.00	31.00
10	145.00	153.00	32.00	170.00	178.00	32.00
12	185.00	195.00	35.00	215.00	225.00	35.00
14	.....	300.00	40.00	.....	340.00	50.00
15	.....	350.00	40.00	.....	400.00	50.00
16	.....	400.00	50.00	.....	450.00	60.00

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 120.

For drilling price list, see page 119. For drilling template, see page 408. For dimensions, see page 410. For description, see page 123.

MEDIUM PRESSURE TAPER SEAT GATE VALVES

No. 3 T

FOR 175 POUNDS WORKING STEAM PRESSURE

For medium steam pressures, ranging from **125 pounds to 175 pounds per square inch**, it is frequently desirable to install gate valves less expensive than the High Pressure Valves shown in the following pages.

The valves shown on page 127, general dimensions of which may be found on page 411, are designed and built for this service. They are taper seat gate valves similar in design to those described on page 129, but lighter.

They will be furnished either Inside Screw or Outside Screw and Yoke. Outside Screw and Yoke valves can be packed when wide open.

All valves will be furnished faced only unless otherwise ordered.

When ordering please give the following information:

Size.

Working pressure.

Whether screw ends or flanged.

Service—whether for steam, water, gas, etc.

Whether inside screw or outside screw and yoke.

Whether gearing is required, if so, type—bevel or spur.

Whether by-pass is required.

MEDIUM GATE VALVES No. 3 T
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT.
FOR STEAM WORKING PRESSURE UP TO 175 POUNDS
TESTED TO 500 POUNDS PER SQUARE INCH

The minimum opening through these valves is 100 per cent of the pipe area.

Inside screw stems are bronze. Outside screw and yoke stems are steel, heavily copper plated.

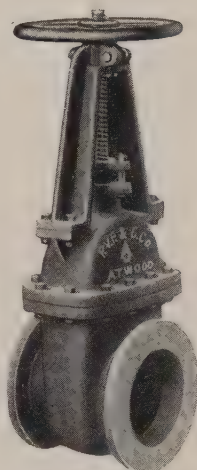
Bronze stems for outside screw and yoke valves will be furnished at an extra price.

These valves are furnished only with double discs.

For sizes 3 inch and smaller, these discs are bronze. All sizes above 3 inch are cast iron bronze mounted.



Inside Screw
Fig. 306



Outside Screw and Yoke
Fig. 307

PRICE LIST

Size Inches	Inside Screw			Outside Screw and Yoke		
	Screwed Each	Flanged Each	Add for By-pass Each	Screwed Each	Flanged Each	Add for By-pass Each
2	\$ 15.00	\$ 17.50	.....	\$ 23.00	\$ 25.50	.....
2½	17.00	19.50	.....	25.00	27.50	.....
3	20.00	23.00	.....	29.00	32.00	.....
3½	25.00	28.00	.....	35.00	38.00	.....
4	28.00	33.00	.....	40.00	45.00	.....
4½	35.00	40.00	.....	50.00	55.00	.....
5	40.00	45.00	.....	54.00	59.00	.....
6	50.00	57.00	\$28.00	65.00	72.00	\$28.00
7	75.00	82.00	28.00	90.00	97.00	28.00
8	87.00	94.00	31.00	110.00	117.00	31.00
9	120.00	127.00	31.00	145.00	152.00	31.00
10	145.00	153.00	32.00	170.00	178.00	32.00
12	185.00	195.00	35.00	215.00	225.00	35.00
14	.....	300.00	40.00	.....	340.00	50.00
15	.....	350.00	40.00	.....	400.00	50.00
16	.....	400.00	50.00	.....	450.00	60.00

Extra for male and female, spotfacing, labor attaching companion flanges, and wooden protectors, see page 188. For drilling price list, see page 186. For drilling template, see page 461. For dimensions, see page 411. For description, see page 126.

MATERIAL FOR HIGH PRESSURE STEAM

This material is for working pressures up to 350 pounds per square inch.

The templates for drilling correspond with "The American Standard for 250 pounds Working Pressure" and all bolt holes are drilled in multiples of four and straddle center lines.

All material will be faced only, unless otherwise ordered.

When superheat is to be maintained, we recommend the use of cast steel and the exclusion of iron castings under pressure, for both valves and fittings. Superheated steam frequently causes cast iron to deteriorate very rapidly in strength and also to "grow" and change in form, and to check and crack dangerously. Our cast steel valves and fittings, illustrated and described on pages 191 to 222, are therefore recommended for this service.

SATURATED STEAM GATE VALVES

250 POUNDS WORKING STEAM PRESSURE

No. 4 T

These valves are suitable for working steam pressures up to 250 pounds per square inch.

They can be made either inside screw or with outside screw and yoke.

O. S. & Y. valves are the standard for steam piping. The stem serves as an indicator of the position of the valve discs, and valves of this type can be packed when wide open under pressure.

We make either solid plug or double disc gate valves, as desired; but we advocate the double disc because it is so much more flexible. Moreover, we have developed a method of attaching the disc nut to the stem, which **absolutely guarantees that the disc nut cannot become detached.** We can take a stem out of any of our stock valves as now made, and by applying torsional strain enough to twist off the steel stem, can, and have, frequently demonstrated, that the stem itself is ruptured without injuring or detaching the disc nut.

Solid discs of bronze are furnished for sizes 3 inch and smaller. For 3½ inch size, double discs are furnished of bronze. For sizes 4 inch and up, discs are furnished of cast iron bronze mounted.

Standard valves for 250 pounds steam are made with semi-steel bodies, solid bronze seats, packing collars and arch nuts and cold rolled steel stems heavily copper plated.

Rolled bronze stems are furnished at an additional price upon order.

We recommend the use of a by-pass on valves 8 inches and larger. Our by-pass does not increase the face to face dimension of the valve, and all its parts, except the body, are interchangeable with the standard valve of the same size.

Where gearing is necessary our standard types of bevel and spur gears, as shown on pages 532 to 536, can be made to fit almost any condition. If special designs are required, these types can be varied to suit.

When ordering please give the following information:

Size.

Working pressure.

Whether screw ends or flanged.

Service—whether for steam, water, gas, etc.

Whether all bronze, iron body bronze mounted, or all iron.

Whether inside screw or outside screw and yoke.

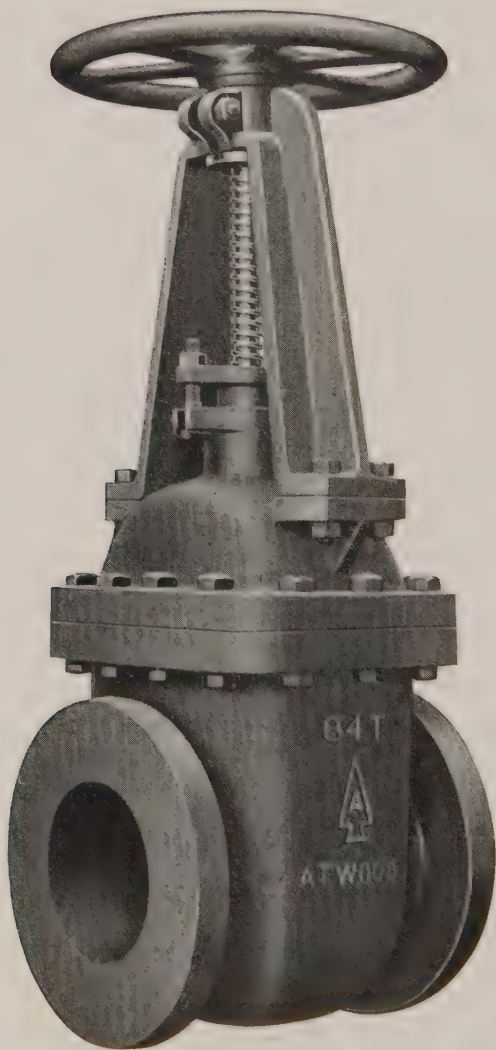
Whether gearing is required, if so, type—bevel or spur.

Whether by-pass is required.

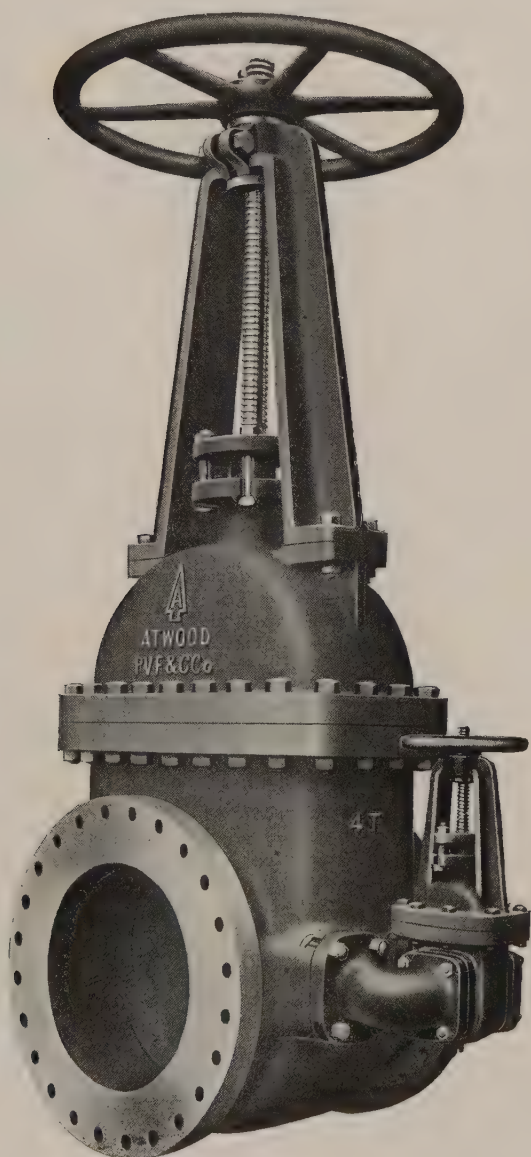
Whether operated by nut or hand wheel.

Are flanges and drilling standard as shown on page 461, or special?

If special, give flange diameter, number and -size of bolt holes and diameter of bolt circle.

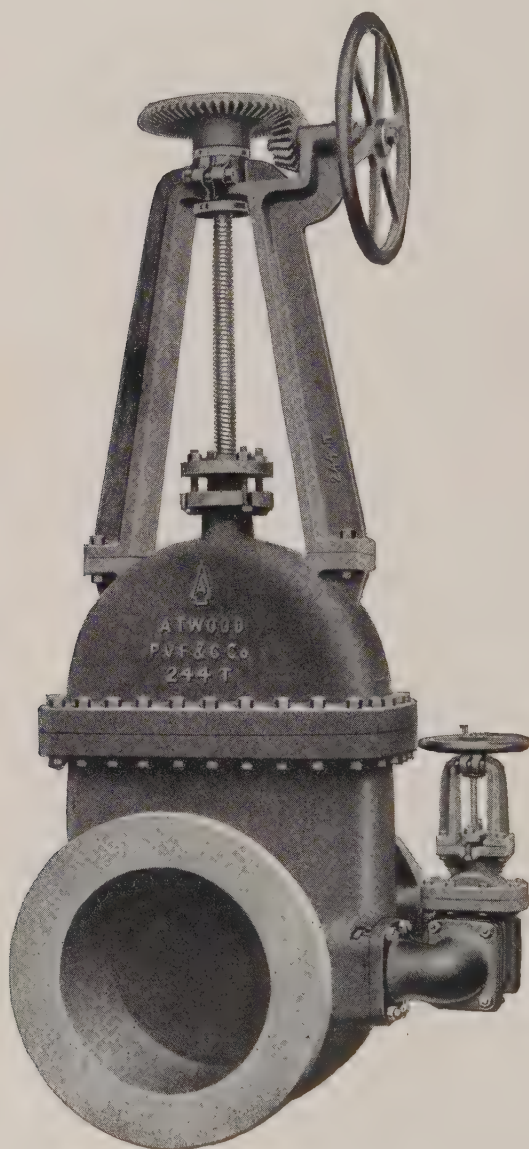


Taper Seat Gate Valve. 250 Pounds Working Steam Pressure



Flanged Gate Valve with By-pass

This type of by-pass does not add to the face to face dimensions of valves so equipped



**24-inch Taper Seat Gate Valve with Bevel Gears and By-pass
250 Pounds Working Steam Pressure**

EXTRA HEAVY GATE VALVES No. 4 T SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT.

250 POUNDS WORKING
STEAM PRESSURE

The minimum opening through these
valves is 100 per cent of the pipe area.

TEST PRESSURES

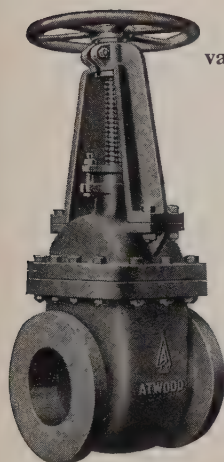
18-inch and smaller tested to
800 pounds.

20-inch and 24-inch tested to
600 pounds.

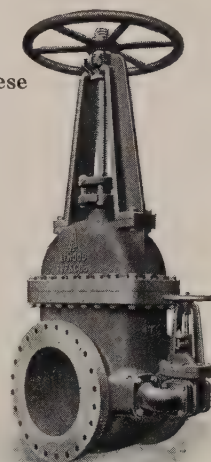
Inside screw stems are bronze.
Outside screw and yoke stems
are steel, heavily copper plated.

Bronze stems for outside
screw and yoke valves will be
furnished at an extra price.

Solid discs of bronze are fur-
nished for sizes 3 inch and small-
er. For 3½ inch size, double
discs of bronze are furnished. For
sizes 4 inch and up double discs
are furnished, cast iron, bronze
mounted.



Plain Valve, Fig. 424



PRICE LIST Valve with By-pass, Fig. 425

Size Inches	Inside Screw			Outside Screw and Yoke		
	Screwed Each	Flanged Each	Flanged with By-pass Each	Screwed Each	Flanged Each	Flanged with By-pass Each
1¼	\$ 24.00	\$ 26.50	.....	\$32.00	\$34.50	.....
1½	25.00	27.50	.....	33.00	35.50	.....
2	27.50	30.00	.....	35.50	38.00	.....
2½	33.00	35.50	.....	41.00	43.50	.....
3	45.00	48.00	.....	54.00	57.00	.....
3½	57.00	60.00	.....	67.00	70.00	.....
4	60.00	65.00	.....	72.00	77.00	.....
4½	77.00	82.00	.....	92.00	97.00	.....
5	85.00	90.00	.....	100.00	105.00	.....
6	100.00	107.00	\$155.00	115.00	122.00	\$170.00
7	125.00	132.00	180.00	140.00	147.00	195.00
8	155.00	162.00	215.00	180.00	187.00	240.00
9	225.00	232.00	285.00	250.00	257.00	310.00
10	250.00	258.00	310.00	275.00	283.00	335.00
12	.....	335.00	400.00	.....	390.00	455.00
14	.....	440.00	510.00	.....	510.00	580.00
15	.....	540.00	610.00	.....	610.00	680.00
16	.....	675.00	750.00	.....	750.00	825.00
18	.....	.....	.....	.....	.....	1050.00
20	.....	.....	.....	.....	.....	1250.00
22	.....	.....	.....	.....	.....	1575.00
24	.....	.....	.....	.....	.....	1700.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188. For drilling price list, see page 186. For drilling template, see page 461. For dimensions, see page 413. For description, see page 129.

EXTRA HEAVY BRONZE GATE VALVES

FLANGED OR SCREWED
TAPER SEAT

FOR WORKING STEAM PRESSURES UP TO 250 POUNDS
TESTED TO 800 POUNDS PER SQUARE INCH



Fig. 471
Inside Screw Valve

The minimum opening through these valves is 100 per cent of the pipe area.



Fig. 4159
Outside Screw and Yoke Valve

Solid discs of bronze are furnished with these valves.

PRICE LIST
INSIDE SCREW VALVE

Size	inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Screwed.....	each	\$4.00	\$5.00	\$6.00	\$ 8.00	\$11.25	\$16.50	\$23.00	\$40.00	\$ 65.00
Flanged.....	each				16.00	21.50	30.00	41.00	65.00	100.00

PRICE LIST
OUTSIDE SCREW AND YOKE VALVE

Size	inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Screwed.....	each	\$10.00	\$13.00	\$17.00	\$23.00	\$35.00
Flanged.....	each	16.00	21.00	27.00	39.00	55.00

For drilling price list, see page 186.
For drilling template, see page 461
For dimensions, see page 416.

GLOBE AND ANGLE VALVES
SEMI-STEEL. BRONZE MOUNTED.
250 POUNDS WORKING STEAM PRESSURE



Globe Valve
Fig. 430

The minimum opening through these valves is 100 per cent of the pipe area.



Angle Valve
Fig. 431

PRICE LIST

Size.....inches	2	2½	3	3½	4	4½	5	6	7	8
Screwed.....each	\$26.00	\$33.00	\$37.00	\$42.00	\$46.00	\$56.00	\$61.00	\$75.00	\$ 95.00	\$114.00
Flanged.....each	27.50	35.00	40.00	45.00	50.00	60.00	65.00	80.00	100.00	120.00

SEMI-STEEL CROSS VALVES
BRONZE MOUNTED. 250 POUNDS WORKING STEAM PRESSURE.

PRICE LIST

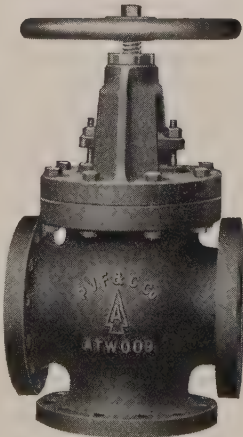
Size.....inches	2	2½	3	3½	4
Screwed.....each	\$33.00	\$40.00	\$45.00	\$50.00	\$55.00
Flanged.....each	35.00	43.00	50.00	55.00	60.00

Size.....inches	4½	5	6	7	8
Screwed.....each	\$70.00	\$75.00	\$95.00	\$120.00	\$145.00
Flanged.....each	75.00	80.00	100.00	125.00	150.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188. For drilling price list, see page 186. For drilling template, see page 461. For dimensions, see page 417.

Due to the large unbalanced pressure, we recommend the use of a by-pass on these valves for sizes larger than 6".

The discs for these valves are bronze, for sizes 7 inch and smaller. All sizes above 7 inch, the discs are cast iron bronze mounted.

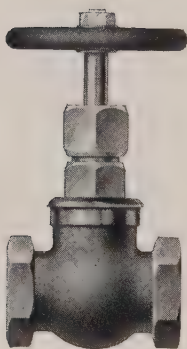


Cross Valve
Fig. 432

EXTRA HEAVY BRONZE GLOBE AND ANGLE VALVES

250 POUNDS WORKING STEAM PRESSURE

The minimum opening through these
valves is 100 per cent of the pipe area.



Globe Valve
Fig. 475



Angle Valve
Fig. 476

PRICE LIST

Size.....Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Price.....each	\$1.30	\$1.50	\$1.90	\$2.50	\$3.50	\$5.00	\$7.00	\$11.00	\$20.00	\$29.00

Prices for flanged valves on application.
For dimensions, see page 418.

EXTRA HEAVY SWING CHECK VALVES

SEMI-STEEL. BRONZE MOUNTED
250 POUNDS WORKING PRESSURE



Fig. 4160

The minimum opening through these valves is 100 per cent of the pipe area.

PRICE LIST

Size .....inches	2	2½	3	3½	4	4½	5
Screwed .....each	\$15.00	\$20.00	\$28.00	\$36.00	\$41.00	\$49.00	\$54.00
Flanged .....each	17.00	22.00	30.00	38.00	44.00	52.00	57.00

Size .....inches	6	7	8	10	12	14	15
Screwed .....each	\$66.00	\$84.00	\$100.00	\$170.00			
Flanged .....each	70.00	88.00	105.00	175.00	\$250.00	\$350.00	\$350.00

Valves 4 inch and smaller, discs are furnished of bronze. Larger than 4 inch, discs are furnished, semi-steel bronze mounted.

Extra for male and female, spotfacing, labor attaching companion flanges, and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 419.

EXTRA HEAVY BRONZE CHECK VALVES
250 POUNDS WORKING PRESSURE



Horizontal Swing
Fig. 477



Angle Lift
Fig. 478

PRICE LIST—LIFT CHECK, SCREWED

Size.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Screwed.....each	\$2.50	\$3.50	\$5.00	\$7.00	\$11.00

For dimensions, see page 418.

PRICE LIST—SWING CHECK, SCREWED

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Screwed.....each	\$3.25	\$3.25	\$4.25	\$6.00	\$7.50	\$12.00	\$25.00

Dimensions on application.

NON-RETURN VALVES

(Stop and Check Valves)

The use of non-return valves on the steam leads from boilers has become such an established practice in modern high pressure plants, and their good points are so well known, that little need be said concerning them.

As a measure of safety, their use frequently prevents great loss in the event of a bursted boiler tube, where if some automatic device were not used the whole plant might be shut down. Also, they absolutely insure the safety of workmen within a boiler from scalding by the careless opening of a valve from the main header, as so frequently occurs. It is impossible to open these valves while there is an excess of pressure on the header side.

TYPES

We manufacture non-return valves of the angle, globe and vertical types. The vertical type will be found convenient if it is desired to use a square or "U" bend for connecting the boiler and header.

SERVICE

Valves for saturated steam are made of semi-steel with bronze mountings while those for super-heated steam are made of cast steel with monel mountings.

DESIGN

The design of our valves is shown on pages 141, 143, 420, and 421. We wish to call attention to the design of dash pot, method of guiding and the clear passageway for steam. Also see pages 201 to 204.

A successful non-return valve must be fitted with an effective dash pot to keep the disc from hammering, and, at the same time, this dash pot must be such that sediment or other foreign matter from the steam will not foul the parts and cause the valve to stick in an open or closed position. This is accomplished in our valves by means of a dash pot, the under side of which is open. The pulsations of the steam are thus balanced against the dash pot piston and the back of the disc proper, while the dash pot, being open, prevents foreign matter collecting underneath the piston.

The guiding of any valve is important, but the guiding of a valve which is to close automatically is vital. We have, therefore, provided a

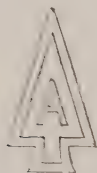
sleeve around the stem over which the disc is fitted. Clearance between the stem and the sleeve makes the alignment of the disc independent of the stem which is liable to be thrown out of line if the bonnet bolts are not drawn up evenly.

It will be noted that the port underneath the disc is entirely clear and that the shape of the disc is such that an easy passage is provided for the steam. These features together with an all-bronze (or all-monel)¹ disc, made as light as consistent with strength, reduce friction loss in the valve to a minimum.

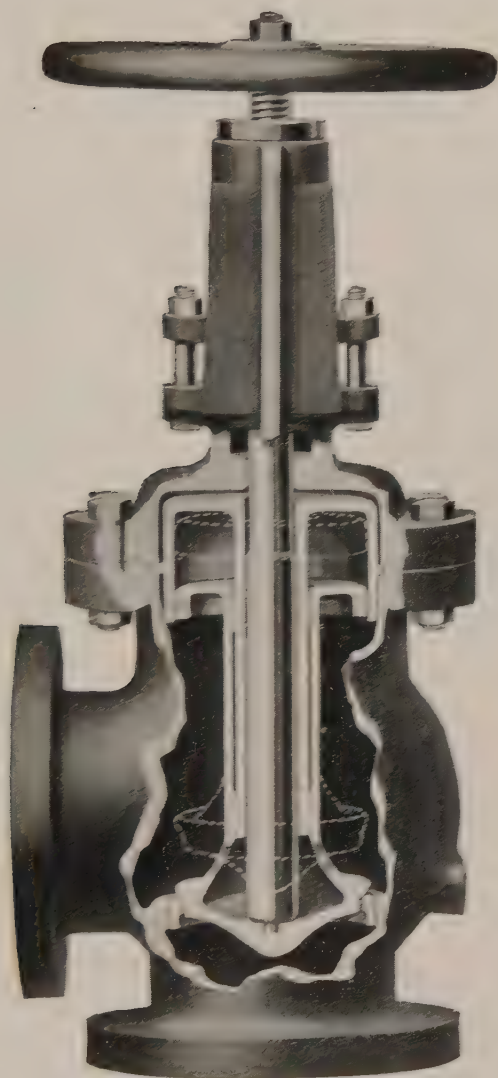
The superheat pattern is provided with a dead steam chamber underneath the stuffing box. This chamber is tapped for a $\frac{1}{2}$ -inch valve for relieving the pressure when repacking, should there be any leakage past the packing collar. See pages 201 to 204.

For prices, see pages 142 and 143.

For dimensions, see pages 458 and 459.



ATWOOD

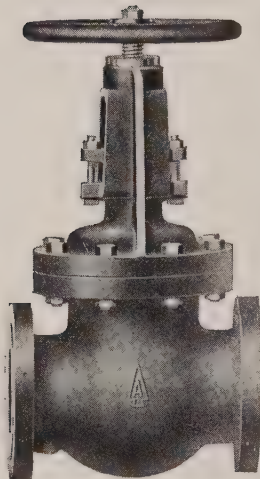


Patented
Balanced Type Angle Non-Return Valve for Saturated Steam

**BALANCED EXTRA HEAVY SEMI-STEEL
NON-RETURN VALVES**

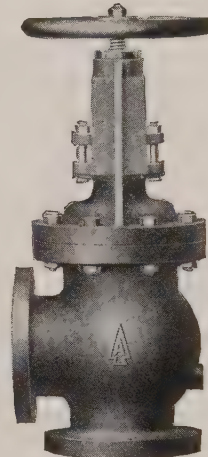
(Stop and Check Valves)

**GLOBE AND ANGLE. BRONZE MOUNTED.
250 POUNDS WORKING STEAM PRESSURE**



**Globe Type
Fig. 428**

The mini-
mum opening
through these
valves is 100
per cent of the
pipe area.



**Angle Type
Fig. 429**

PRICE LIST

Size Inches	Globe or Angle	Size Inches	Globe or Angle
2½	\$ 90.00	6	\$190.00
3	100.00	7	240.00
4	120.00	8	290.00
5	160.00	10	480.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 420.

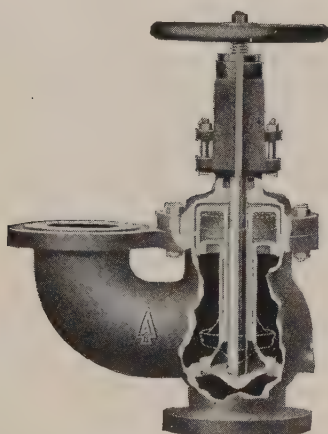
For description, see page 139.

BALANCED EXTRA HEAVY SEMI-STEEL NON-RETURN VALVES

(Stop and Check Valves)

VERTICAL TYPE. BRONZE MOUNTED

250 POUNDS WORKING STEAM PRESSURE



Patented

Fig. 4054

The minimum opening through these valves is 100 per cent of the pipe area.

PRICE LIST

Size Inches	Each	Size Inches	Each
2½	\$ 90.00	6	\$190.00
3	100.00	7	240.00
4	120.00	8	290.00
5	160.00	10	480.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 421.

For description, see page 139.

BLOW-OFF VALVES
250 POUNDS WORKING STEAM PRESSURE
SEMI-STEEL

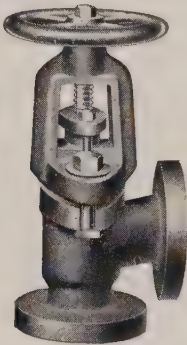


Fig. 435

We have manufactured this type of blow-off valve for many years, and though we have installed and used many other types, have found none superior to it. The seat is renewable by simply driving out the worn one and driving in a new one. Discs are renewable by rebabbiting with a good hard metal.

PRICE LIST

Size.....inches	2	2½	3
Screwed.....each	\$15.00	\$20.00	\$30.00
Flanged.....each	15.00	20.00	30.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 422.

BUTTERFLY EMERGENCY VALVES

250 POUNDS WORKING STEAM PRESSURE

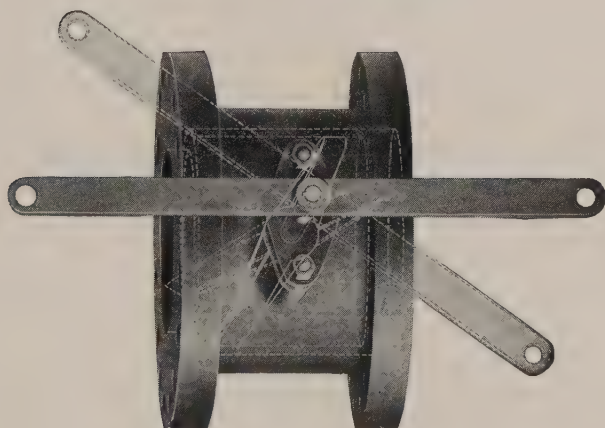


Fig. 434

A valve of this type installed in the steam pipe to an engine makes an admirable emergency shut-off valve. It is efficient and never requires attention.

Valves will be furnished brass lined or all iron, as desired.

PRICE LIST

Size.....inches	4	5	6	7	8	10	12
All Iron.....each	\$44.00	\$50.00	\$54.00	\$ 65.00	\$ 75.00	\$ 96.00	\$115.00
Brass Lined.....each	61.00	74.00	84.00	100.00	115.00	146.00	180.00

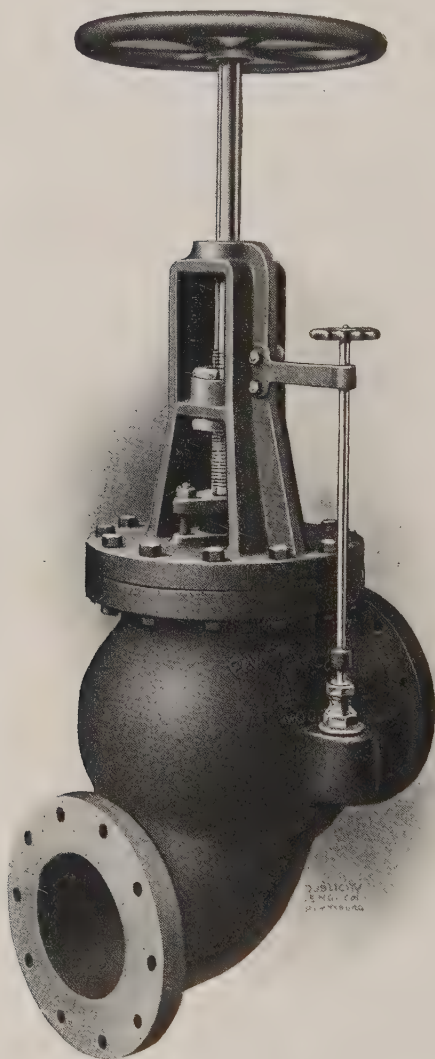
Size.....inches	14	16	18	20	22	24
All Iron.....each	\$170.00	\$220.00	\$250.00	\$280.00	\$330.00	\$390.00
Brass Lined.....each	255.00	360.00	400.00	470.00	530.00	650.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

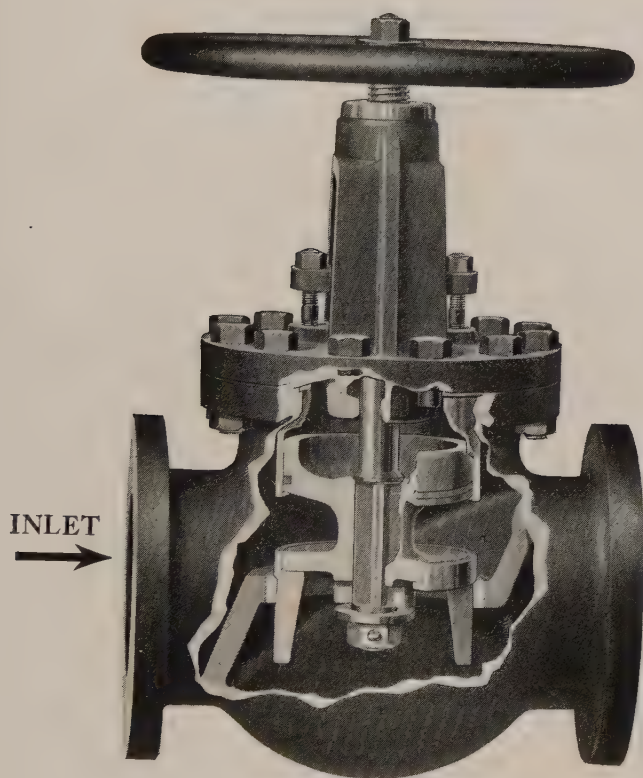
For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 424.



Special Throttle Valve



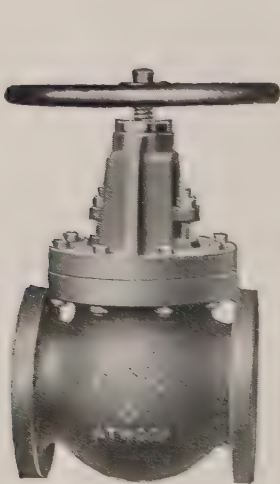
Balanced Throttle Valve

EXTRA HEAVY BALANCED THROTTLE
VALVES

SEMI-STEEL. BRONZE MOUNTED
FOR SATURATED STEAM

250 POUNDS WORKING STEAM PRESSURE

The minimum opening through these
valves is 100 per cent of the pipe area.



Globe Type
Fig. 4055



Angle Type
Fig. 4056

PRICE LIST

Size.....inches	4	6	8	10	12
Globe Type					
Angle Type	Each \$100.00	\$160.00	\$240.00	\$400.00	\$700.00

Extra for drilling see page 100

Extra for male and female spacing, labor attaching companion flanges, and
wooden protectors, see page 188

For drilling template, see page 411

For dimensions, see page 415.

REGISTER VALVES

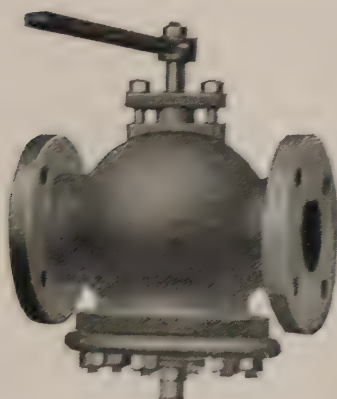


Fig. 9002

PRICE LIST

Size.....inches	1½	2	2½	3	4	5	6
Faced only each	\$20.00	\$24.00	\$30.00	\$40.00	\$60.00	\$80.00	\$100.00

These valves are of the rotating type, having a flat disc ground to a joint on its seat. They are made all iron with steel stems.

Page 426 shows a sectional view which illustrates the construction of the valve.

Extra for male and female flangeing and wooden protectors, see page 188.

For drilling price list, see page 146.

For drilling templates, see page 461.

For dimensions, see page 426.

FITTS CHRONOMETER GOVERNOR VALVES

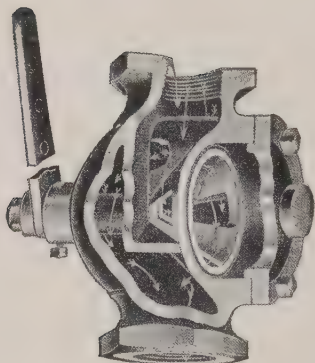
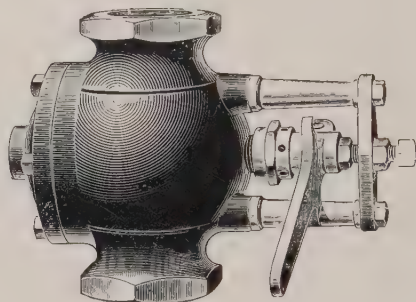


Fig. 999



With Yoke. Fig. 9001

PRICE LIST

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Iron Body...each				\$40.00	\$50.00	\$ 60.00	\$ 80.00	\$100.00	\$150.00
Bronze .....each			\$30.00	50.00	60.00	80.00	120.00	150.00	220.00
Iron Body, with Yoke.....each					60.00	80.00	100.00	140.00	180.00
Bronze, with Yoke.....each	\$40.00	\$40.00	50.00	60.00	80.00	100.00	140.00	180.00	260.00

These valves are of the rotating-valve type, having a conical valve, ground to a joint on its seat, with ports so arranged that a rotation through an angle of 45 degrees, or one-eighth turn, completely opens or closes the valve.

The accompanying sectional view of the valve illustrates its simple interior; the arrows indicate the course of steam, water or gas. Its form is such that it is unaffected by expansion, and is as tight when subjected to steam pressure as when cold. The ports close with a shearing action, protecting their edges and stopping the flow of fluid gradually.

The Plain Chronometer Valve is balanced by the pressure only. No stuffing-box is required, as the valve fits sufficiently close to prevent leakage in ordinary service. Stops are arranged in a collar attached to the hub of the valve.

Chronometer Valves are useful for a large variety of purposes requiring a simple, durable and easy working valve, and have been especially successful on steam, pump and air-compressor governors, float valves for tanks, and automatic devices.

Chronometer Valves are made in two styles: with and without outside yoke. The interior of both is similar.

The Yoke Chronometer Valve has an outside yoke, which, with a set screw, forms a bearing for the end of the stem, regulating the closeness of contact of the valve with its seat and consequent friction, so that varying degrees of sensibility may be obtained, according to the requirements of the service. The valve is thus perfectly balanced regardless of pressure conditions. It is also fitted with a stuffing-box. When close regulation and easy working are essential, or a possible leakage around the stem under high pressure would be objectionable, the Yoke pattern should be used.

NOTES ON STEAM SEPARATORS FOR SATURATED AND SUPERHEATED STEAM

An efficient steam separator should embody the following features:

1. The direction of the steam should be changed; but not enough to make its passage tortuous, thereby adding friction.
2. The volume of the interior of separators should be such that no constricted passages occur to cause the velocity of the steam to increase and entrained water to be carried over.
3. Where steam impinges upon a baffle plate and changes direction the corrugations or ribs on the baffle plate should be across the direction taken by the steam.

An examination of our separator will show that every condition for good separation is met.

Every passage through the separator has an ample margin over the pipe area. The deflecting plates throw the steam always across the corrugations. A well, ample in size, to hold sudden influxes of water, is provided, and the whole is strongly constructed, but of compact and neat appearance.

Our vertical and angle type separators embody the same good features, and the general efficiency of our product is emphasized by a growing demand, a great proportion of which is repeat orders.

Standard Horizontal, Vertical and Angle Separators are made with semi-steel and cast steel bodies and wells. For general dimensions see pages 428 to 431 for semi-steel, and cast steel.

Where it is desirable to have an additional storage capacity for steam at a point near the engine, the separator with receiver well, shown on pages 158 and 209 may be used to advantage. The heads of these separators are the same as those on the standard line, while the wells are steel throughout. These wells are welded both in the longitudinal and vertical seams, no rivets whatsoever being used. General dimensions of this type of Separator will be found on page 432 for semi-steel, and cast steel.

Steel Shell Receiver Separators are constructed upon the same general principles as the smaller separators, and are shown on page 159. General dimensions of this type of separator are shown on pages 433 to 436.

With a steam receiver of ample volume, say, three times the volume of a high pressure cylinder supplied, placed as near the engine as may be,

it has been found that the steam main to the receiver can be reduced in size below the diameter of the engine supply without creating undue velocity of steam in the main. The use of a receiver greatly reduces vibration. The lead from the receiver to the engine should be of the full size called for.

A Receiver Separator is a difficult piece of work to make absolutely and permanently tight if rivets are used. We have therefore developed a line of welded receiver separators which we can guarantee absolutely.

Our "Interlocked Neck" and "Atwood Line Weld" enter into their construction. See pages 348 and 349. These details have long since passed the experimental stage and under the most severe service have proven their reliability.

Inquiries should give details as to pressure, service, etc.



ATWOOD HORIZONTAL SEPARATOR

SECTIONAL VIEW

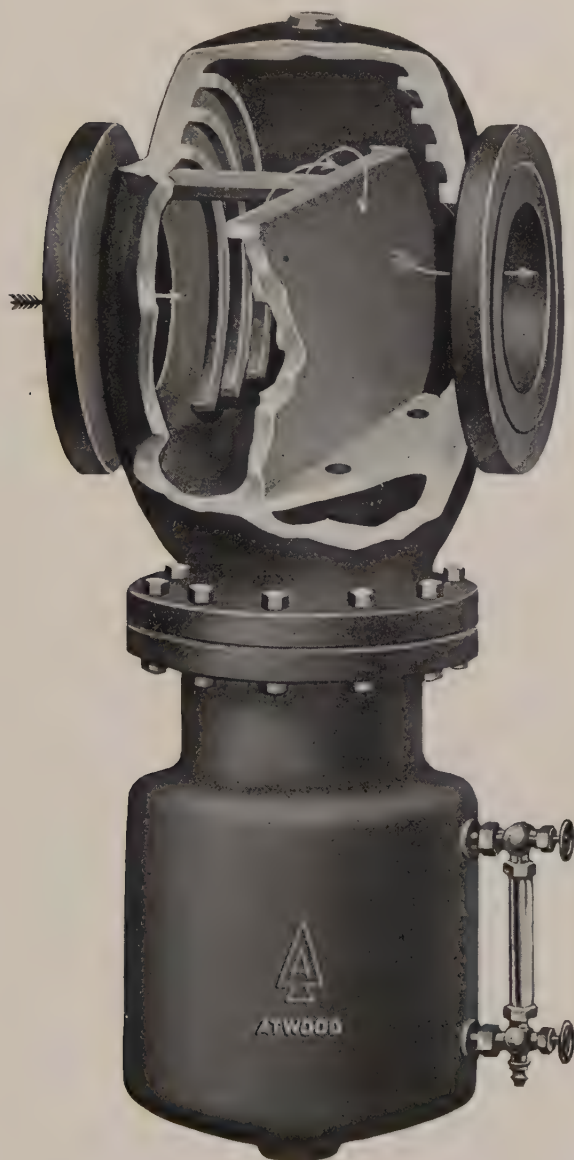


Fig. 4161

ATWOOD VERTICAL SEPARATOR

SECTIONAL VIEW

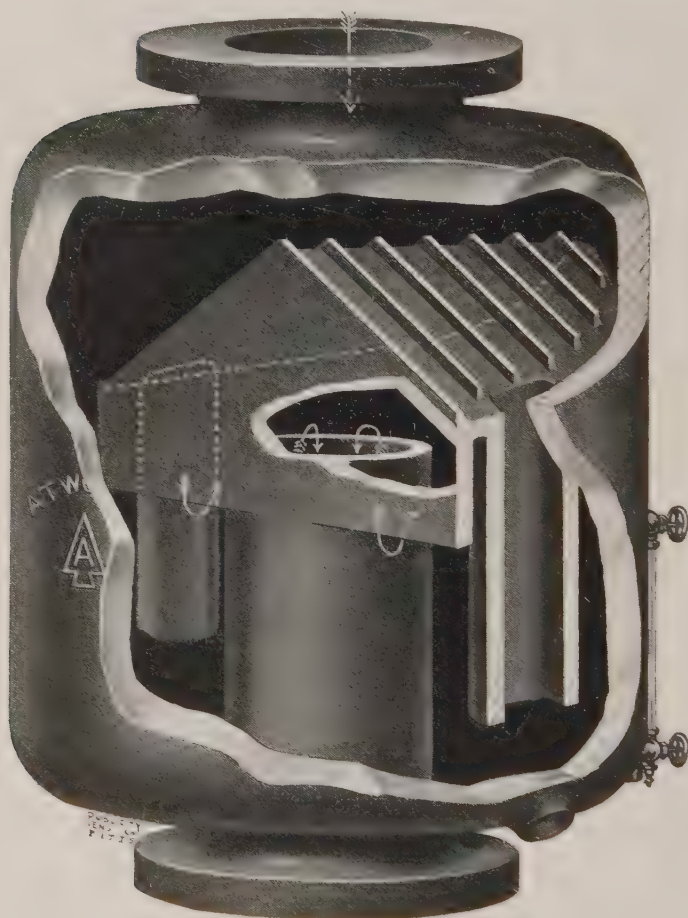


Fig. 438

STEAM SEPARATORS
HORIZONTAL AND VERTICAL
SEMI-STEEL
250 POUNDS WORKING STEAM PRESSURE



Horizontal Separator
Fig. 4162



Vertical Separator
Fig. 4163

PRICE LIST

Size	inches	1½	2	2½	3	3½	4	4½
Horizontal Separator	each	\$26.50	\$31.00	\$37.50	\$46.00	\$55.00	\$64.00	\$75.00
Vertical Separator...								
Size	inches	5	6	7	8	9	10	12
Horizontal Separator	each	\$84.00	\$108.00	\$128.00	\$147.00	\$187.00	\$187.00	\$220.00
Vertical Separator...								

Larger sizes, prices on application.
The above prices include Water Gauge, Drain Valve and Nipple.
Extra for male and female, spot facing, labor attaching companion flanges and wooden protectors, see page 188.
For drilling template, see page 461.
For dimensions, Horizontal Separator, see page 428.
For dimensions, Vertical Separator, see page 429.
For description, see page 151.

ANGLE STEAM SEPARATORS
TOP INLET, SIDE OUTLET. SEMI-STEEL
250 POUNDS WORKING STEAM PRESSURE



Fig. 4164

Prices on Application

For drilling template, see page 461.

For dimensions, see page 430.

For description, see page 151.

ANGLE STEAM SEPARATORS
SIDE INLET, TOP OUTLET. SEMI-STEEL
250 POUNDS WORKING STEAM PRESSURE



Fig. 4165

Prices on Application

For drilling template, see page 461.

For dimensions, see page 431.

For description, see page 151.

STEAM SEPARATORS WITH RECEIVER WELL

250 POUNDS WORKING STEAM PRESSURE



Fig. 4166

Prices on Application

These Separators are made with semi-steel heads and wrought steel wells. See remarks on page 151.

General dimensions on page 432.

For drilling template, see page 461.

RECEIVER SEPARATORS
250 POUNDS WORKING STEAM PRESSURE



Fig. 4167
PRICE LIST
Horizontal and Vertical

Size.....inches	5	6	8	10	12	14
Each.....	\$525.00	\$600.00	\$900.00	\$1100.00	\$1350.00	\$1650.00

Size.....inches	16	18	20	22	24
Each.....	\$2100.00	\$2550.00	\$3300.00	\$4000.00	\$4900.00

Constructed without the use of rivets. The heads are welded in, the joint used, being similar to the "Atwood Line Weld", while the necks are attached by the "Interlock Method."

For description, see page 151.

For dimensions, see pages 433 to 436.

DRIP POCKETS
250 POUNDS WORKING STEAM PRESSURE
SEMI-STEEL

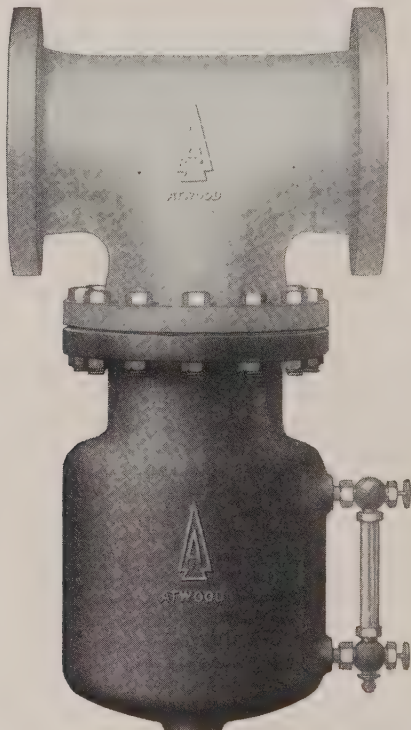


Fig. 4168

PRICE LIST

Size.....inches	3	4	5	6	8	10	12
Faced. ....each	\$21.00	\$24.00	\$28.00	\$35.00	\$52.00	\$77.00	\$115.00
Faced and Drilled.....each	22.00	26.00	30.00	37.00	55.00	80.00	120.00

A 12-inch drip pocket is the largest size that need be used.
Prices do not include the tee shown in the cut nor the gauge.
For dimensions, see page 437.
For drilling template, see page 461.

NOTES ON EXPANSION

Too much attention cannot be paid to the proper provision for allowing piping to expand and contract without undue strain.

By far the most satisfactory method of taking care of expansion is to use pipe bends of liberal radii. They never require attention.

The unbalanced or slip expansion joint should not be used for high pressure steam where it is possible to avoid it, but if for lack of room no other form of joint can be used, the utmost care must be taken to secure the line to an anchorage which the unbalanced thrust cannot move under any circumstances, and also to secure the line against buckling.

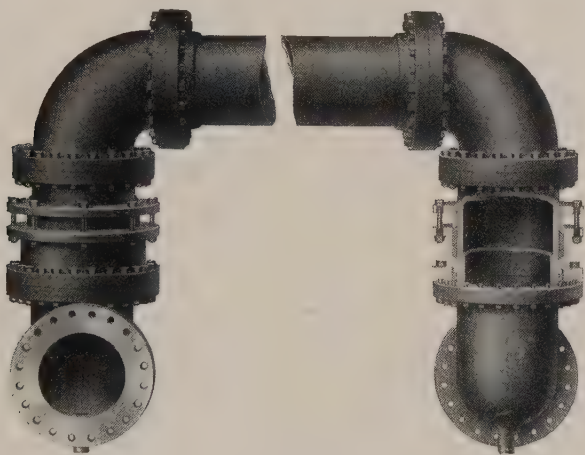


Fig. 449

Expansion Taken Care of by Means of Swivel Joints

Swivel joints may be used with good results in the manner shown above. A cut of swivel joint is shown on page 165. Provision should here be made for draining the entry side, either by tapping the elbow or substituting therefor a tee with a drip pocket underneath.

The balanced expansion joint, shown on page 163, illustrates a very satisfactory straightway joint, perfectly balanced and requiring only such anchorage as will react with sufficient force to overcome the friction of the stuffing boxes. This joint is made with various amounts of traverse and with bronze sleeve, or iron sleeve in bronze bushings, as desired.

UNBALANCED EXPANSION JOINTS

SEMI-STEEL. WITH TIE RODS. BRONZE SLIP.

250 POUNDS WORKING STEAM PRESSURE.

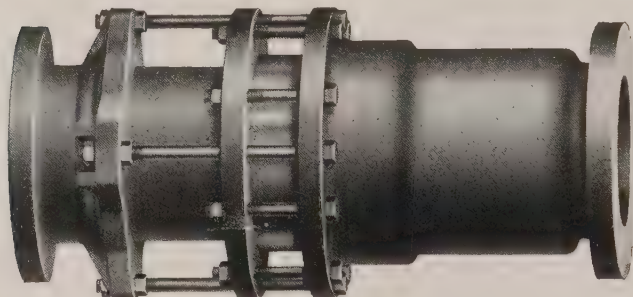


Fig. 450

Read Carefully Notes on Expansion, page 161.

PRICE LISTS STANDARD TRAVERSE

Size.....inches	2	2½	3	3½	4	5	6	7
Screwed...each	\$30.00	\$40.00	\$50.00	\$60.00	\$70.00	\$80.00	\$100.00	\$120.00
Flanged...each	35.00	45.00	55.00	65.00	75.00	85.00	105.00	125.00
Traverse.inches	2½	2½	2¾	3	3¼	4	5	6
Size.....inches	8	9	10	12	14	15	16	18
Screwed...each	\$145.00	\$190.00	\$240.00	\$290.00				
Flanged...each	150.00	200.00	250.00	300.00	\$500.00	\$500.00	\$750.00	\$1000.00
Traverse.inches	7	7	7	8	10	10	10	10

FLANGED—SPECIAL TRAVERSE

Traverse	Size....in.	2	2½	3	3½	4	5	6	7	8
4-in. Each...		\$40.00	\$50.00	\$60.00	\$70.00	\$80.00				
6-in. Each...		45.00	55.00	65.00	75.00	85.00	\$90.00	\$110.00		
10-in. Each...		50.00	60.00	70.00	80.00	90.00	100.00	130.00	\$150.00	\$180.00
12-in. Each...		55.00	65.00	75.00	85.00	95.00	110.00	140.00	165.00	210.00
14-in. Each...		60.00	70.00	80.00	90.00	100.00	120.00	150.00	180.00	240.00
16-in. Each...		65.00	75.00	85.00	95.00	105.00	130.00	160.00	195.00	270.00

The expansion of pipe averages from two to three inches in 100 feet.

The greatest of care is necessary where these joints are installed under high pressure steam, on account of the unbalanced thrust.

Unbalanced joints will be furnished unpacked at the above prices.

Packing will be furnished at an extra charge upon receipt of information as to pressure and service.

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 461.

For dimensions, see page 438.

For description, see page 161.



24-inch Balanced Expansion Joint

BALANCED EXPANSION JOINTS
SEMI-STEEL
250 POUNDS WORKING STEAM PRESSURE

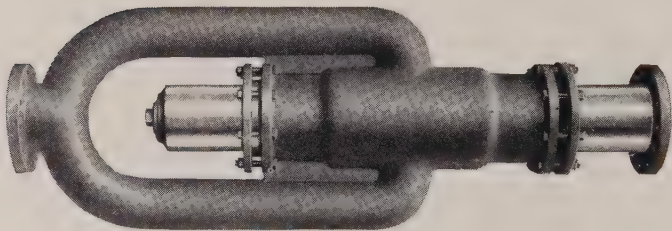


Fig. 452

PRICE LIST

Size.....inches	6	8	10	12	14	16	18	20	22	24
	Prices on Application									

Made with bronze or semi-steel slips.

See Notes on Expansion, Page 161.

Balanced Expansion Joints will be furnished unpacked unless otherwise ordered.
For drilling template, see page 461.
For dimensions, see page 439.
For description, see page 161.

SWIVEL JOINTS
SEMI-STEEL BODY. BRONZE MOUNTED
250 POUNDS WORKING STEAM PRESSURE

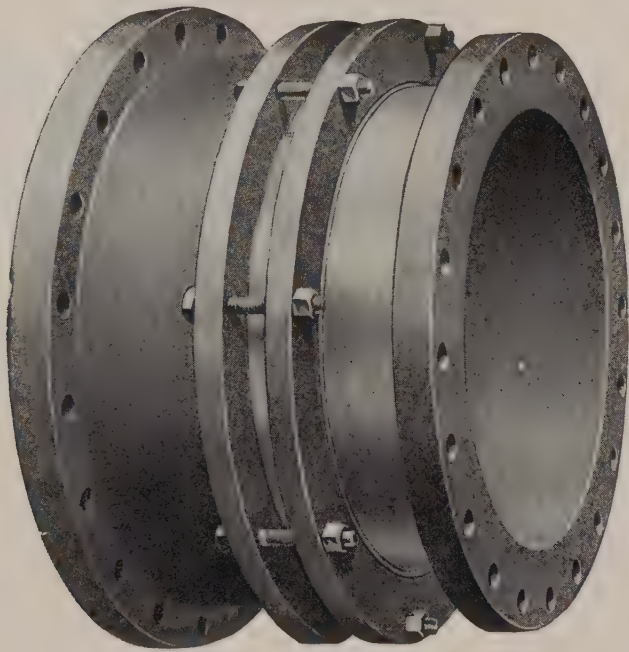


Fig. 451

PRICE LIST

Size.....inches	4	5	6	8	10	12	14	16	18	20	22	24
	Prices on Application											

See Notes on Expansion, Page 161

Swivels will be furnished unpacked unless otherwise ordered.
This type of swivel requires the use of an elbow or tee with one special flange.
For drilling template, see page 461.
For dimensions, see page 440.
For description, see page 161.

SEMI-STEEL FLANGED ELBOWS

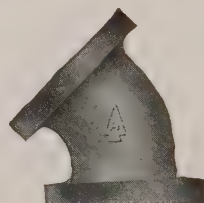
250 POUNDS WORKING STEAM PRESSURE



90° Elbow
Fig. 456



Long Radius Elbow
Fig. 457



45° Elbow
Fig. 458

PRICE LIST

Elbows			L. R. Elbows			45 Degree Elbows		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$ 4.50	\$ 5.40	1¼	.....	.....	1¼	\$ 5.00	\$ 5.90
1½	4.50	5.40	1½	.....	.....	1½	5.00	5.90
2	4.50	5.40	2	\$7.50	\$ 8.85	2	5.00	5.90
2½	4.75	5.65	2½	8.00	9.35	2½	5.25	6.15
3	5.15	6.25	3	8.60	10.25	3	5.65	6.75
3½	6.10	7.35	3½	10.25	12.15	3½	6.75	8.00
4	6.75	8.25	4	11.25	13.50	4	7.50	9.00
4½	8.25	9.75	4½	13.75	16.00	4½	9.00	10.50
5	9.35	10.85	5	15.50	17.75	5	10.35	11.85
6	11.40	13.40	6	19.00	22.00	6	12.50	14.50
7	15.75	18.00	7	26.50	29.85	7	16.50	18.75
8	18.00	20.50	8	30.00	33.75	8	19.00	21.50
9	25.50	28.85	9	42.50	47.50	9	26.75	30.10
10	28.50	32.50	10	47.75	53.75	10	30.00	34.00
12	42.00	46.50	12	70.00	76.75	12	44.00	48.50
14	62.00	67.50	14	103.50	111.75	14	62.00	67.50
15	70.00	77.00	15	117.00	127.00	15	70.00	77.00
16	82.00	90.00	16	137.00	149.00	16	82.00	90.00
18	106.00	115.00	18	177.00	191.00	18	106.00	115.00
20	135.00	145.00	20	225.00	240.00	20	135.00	145.00
22	170.00	183.00	22	285.00	305.00	22	170.00	183.00
24	210.00	225.00	24	350.00	373.00	24	210.00	225.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling template, see page 461.

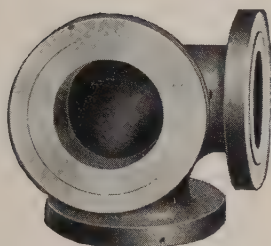
For dimensions, see pages 441 and 442.

For description, see page 22.

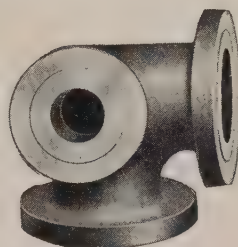
EXTRA HEAVY FLANGED SIDE OUTLET ELBOWS

SEMI-STEEL

250 POUNDS WORKING STEAM PRESSURE



**Flanged
Side Outlet Elbows
Fig. 4169**



**Flanged
Side Outlet Reducing Elbows
Fig. 4170**

Size.....inches Fig. 4169	4	5	6	7	8	10	12	14	16
Faced .. each	\$35.75	\$37.75	\$42.00	\$51.75	\$61.25	\$89.00	\$113.25	\$146.75	\$168.00
Faced and Drilled .. each	\$38.00	\$40.00	\$45.00	\$55.00	\$65.00	\$95.00	\$120.00	\$155.00	\$180.00

Size.....inches Fig. 4170	4	5	6	7	8	10	12	14	16
Faced .. each	\$39.75	\$41.75	\$47.00	\$56.75	\$67.25	\$99.00	\$123.25	\$161.75	\$183.00
Faced and Drilled .. each	\$42.00	\$44.00	\$50.00	\$60.00	\$71.00	\$105.00	\$130.00	\$170.00	\$195.00

Orders should specify whether outlet is to be on radial or intersecting center lines.

Furnished faced only, unless otherwise ordered.

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

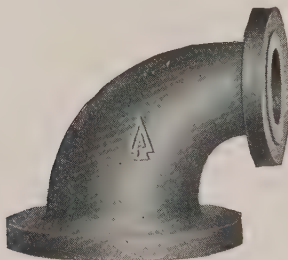
For dimensions, see pages 441 to 443.

For drilling template, see page 461.

For description, see page 22.

EXTRA HEAVY SEMI-STEEL FLANGED REDUCING ELBOWS

250 POUNDS WORKING STEAM PRESSURE



Reducing Elbow
Fig. 4057

PRICE LIST

Size Inches	Faced Each	Faced and Drilled Each	Center to Face Inches	Size Inches	Faced Each	Faced and Drilled Each	Center to Face Inches
2 x 1½	\$ 9.00	\$ 9.90	5	7 x 6	\$ 31.50	\$ 33.75	9
2 x 1½	9.00	9.90	5	8 x 4	36.00	38.50	10
2½ x 1½	9.50	10.40	5½	8 x 5	36.00	38.50	10
2½ x 2	9.50	10.40	5½	8 x 6	36.00	38.50	10
3 x 1½	10.25	11.35	6	8 x 7	36.00	38.50	10
3 x 2	10.25	11.35	6	10 x 5	57.00	61.00	11½
3 x 2½	10.25	11.35	6	10 x 6	57.00	61.00	11½
3½ x 2	12.25	13.50	6½	10 x 7	57.00	61.00	11½
3½ x 2½	12.25	13.50	6½	10 x 8	57.00	61.00	11½
3½ x 3	12.25	13.50	6½	12 x 7	84.00	88.50	13
4 x 2	13.50	15.00	7	12 x 8	84.00	88.50	13
4 x 2½	13.50	15.00	7	12 x 9	84.00	88.50	13
4 x 3	13.50	15.00	7	12 x 10	84.00	88.50	13
4 x 3½	13.50	15.00	7	14 x 6	105.00	110.50	15
5 x 2½	18.75	20.25	8	14 x 10	105.00	110.50	15
5 x 3	18.75	20.25	8	14 x 12	105.00	110.50	15
5 x 4	18.75	20.25	8	15 x 6	120.00	127.00	15½
6 x 3	22.75	24.75	8½	15 x 10	120.00	127.00	15½
6 x 3½	22.75	24.75	8½	15 x 12	120.00	127.00	15½
6 x 4	22.75	24.75	8½	16 x 8	135.00	143.00	16½
6 x 4½	22.75	24.75	8½	16 x 10	135.00	143.00	16½
6 x 5	22.75	24.75	8½	16 x 12	135.00	143.00	16½
7 x 4	31.50	33.75	9	16 x 14	135.00	143.00	16½
7 x 5	31.50	33.75	9	.....	.....	.....	.....

Furnished faced only, unless otherwise ordered.

Flanged Taper Reducing Elbows not listed above will be made to order at a special price.

Extra for male and female, spotfacing, labor attaching companion flanges, and wooden protectors, see page 188.

For drilling template, see page 461.

For description, see page 22.

SEMI-STEEL FLANGED BASE ELBOWS
250 POUNDS STEAM PRESSURE



Base Elbow
 Fig. 461

PRICE LIST

Size Inches	Faced Except Base Each	Faced and Drilled Except Base Each	Extra for Facing and Drilling Base Each
2	\$ 9.00	\$ 9.90	Prices on Application
2½	9.50	10.40	
3	10.25	11.35	
3½	12.25	13.50	
4	13.50	15.00	
4½	16.50	18.00	
5	18.75	20.25	
6	22.75	24.75	
7	31.50	33.75	
8	36.00	38.50	
9	51.00	54.35	
10	57.00	61.00	
12	84.00	88.50	
14	105.00	110.50	
15	120.00	127.00	
16	135.00	143.00	
18	157.00	166.00	
20	180.00	190.00	
22	225.00	238.00	
24	285.00	300.00	

Bases can be made square or round. Square bases will be furnished unless otherwise ordered.

Diameter and drilling of Round Bases correspond with standard flanges.

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

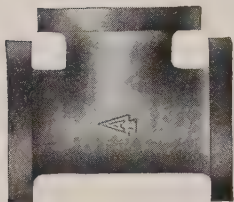
For drilling template, see page 461.

For dimensions, see page 537.

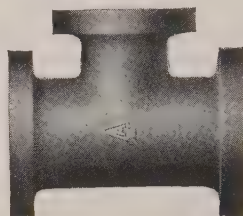
For description, see page 22.

SEMI-STEEL FLANGED TEES

250 POUNDS WORKING STEAM PRESSURE



Straight Tee
Fig. 453



Reducing Tee
Fig. 454

PRICE LIST

Tees			Reducing Tees		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$ 6.50	\$ 7.85	.....	.....	.....
1½	6.50	7.85	1½	\$ 7.50	\$ 8.85
2	6.50	7.85	2	7.50	8.85
2½	6.90	8.25	2½	8.00	9.35
3	7.50	9.15	3	8.60	10.25
3½	8.90	10.80	3½	10.25	12.15
4	9.75	12.00	4	11.25	13.50
4½	12.00	14.25	4½	13.75	16.00
5	13.50	15.75	5	15.50	17.75
6	16.50	19.50	6	19.00	22.00
7	23.00	26.35	7	26.50	29.85
8	26.00	29.75	8	30.00	33.75
9	37.00	42.00	9	42.50	47.50
10	41.50	47.50	10	47.75	53.75
12	61.00	67.75	12	70.00	76.75
14	90.00	98.25	14	103.50	111.75
15	102.00	112.00	15	117.00	127.00
16	119.00	131.00	16	137.00	149.00
18	154.00	168.00	18	177.00	191.00
20	195.00	210.00	20	225.00	240.00
22	247.00	267.00	22	285.00	305.00
24	305.00	328.00	24	350.00	373.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling template, see page 461.

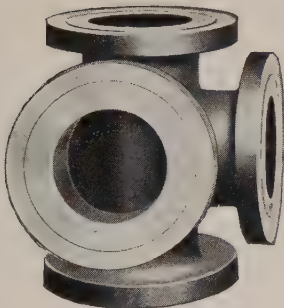
For dimensions, see pages 441 to 443.

For description, see page 22.

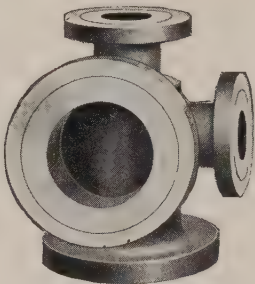
EXTRA HEAVY FLANGED SIDE OUTLET
TEES

SEMI-STEEL

250 POUNDS WORKING STEAM PRESSURE



Flanged
Side Outlet Tees
Fig. 4171



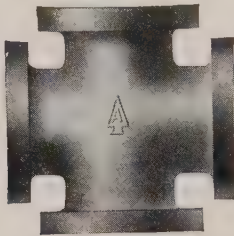
Flanged
Side Outlet Reducing Tees
Fig. 4172

Size inches Fig. 4171	4	5	6	7	8	10	12	14	16
Faced . . each	\$42.00	\$47.00	\$53.50	\$63.00	\$72.50	\$102.00	\$131.00	\$159.00	\$184.00
Faced and Drilled . each	\$45.00	\$50.00	\$57.50	\$67.50	\$77.50	\$110.00	\$140.00	\$170.00	\$200.00

Size inches Fig. 4172	4	5	6	7	8	10	12	14	16
Faced . . each	\$47.00	\$52.00	\$59.00	\$70.50	\$80.00	\$112.00	\$146.00	\$174.00	\$204.00
Faced and Drilled . each	\$50.00	\$55.00	\$63.00	\$75.00	\$85.00	\$120.00	\$155.00	\$185.00	\$220.00

Furnished faced only, unless otherwise ordered.
Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.
For dimensions, see pages 441 to 443.
For drilling template, see page 461.
For description, see page 22.

SEMI-STEEL FLANGED CROSSES
250 POUNDS WORKING STEAM PRESSURE



Cross
Fig. 455

PRICE LIST

Crosses			Reducing Crosses		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	\$ 10.00	\$ 11.80	....	.....	.....
1½	10.00	11.80	....	.....	.....
2	10.00	11.80	2	\$ 11.50	\$ 13.30
2½	10.50	12.30	2½	12.00	13.80
3	11.50	13.75	3	13.25	15.50
3½	13.50	16.00	3½	15.50	18.00
4	15.00	18.00	4	17.00	20.00
4½	18.00	21.00	4½	21.00	24.00
5	20.50	23.50	5	23.50	26.50
6	25.00	29.00	6	29.00	33.00
7	35.00	39.50	7	40.00	44.50
8	40.00	45.00	8	46.00	51.00
9	56.00	62.75	9	65.00	71.75
10	63.00	71.00	10	72.00	80.00
12	92.00	101.00	12	106.00	115.00
14	136.00	147.00	14	158.00	169.00
15	155.00	169.00	15	177.00	191.00
16	180.00	196.00	16	207.00	223.00
18	235.00	253.00	18	270.00	288.00
20	300.00	320.00	20	345.00	365.00
22	375.00	401.00	22	430.00	456.00
24	465.00	495.00	24	535.00	565.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling template, see page 461.

For dimensions, see pages 441 to 443.

For description, see page 22.

SEMI-STEEL FLANGED LATERALS

250 POUNDS WORKING STEAM PRESSURE



Lateral
Fig. 459

PRICE LIST

Laterals			Reducing Laterals		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1¼	10.00	11.80	.....	.....	.....
1½	10.00	11.80	.....	.....	.....
2	10.00	11.80	2	11.50	13.30
2½	10.50	12.30	2½	12.00	13.80
3	11.50	13.75	3	13.25	15.50
3½	13.50	16.00	3½	15.50	18.00
4	15.00	18.00	4	17.00	20.00
4½	18.00	21.00	4½	21.00	24.00
5	20.50	23.50	5	23.50	26.50
6	25.00	29.00	6	29.00	33.00
7	35.00	39.50	7	40.00	44.50
8	40.00	45.00	8	46.00	51.00
9	56.00	62.75	9	65.00	71.75
10	63.00	71.00	10	72.00	80.00
12	92.00	101.00	12	106.00	115.00
14	136.00	147.00	14	158.00	169.00
15	155.00	169.00	15	177.00	191.00
16	180.00	196.00	16	207.00	223.00
18	235.00	253.00	18	270.00	288.00
20	300.00	320.00	20	345.00	365.00
22	375.00	401.00	22	430.00	456.00
24	465.00	495.00	24	535.00	565.00

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

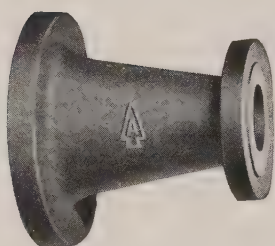
For drilling template, see page 461.

For dimensions, see pages 441 and 442.

For description, see page 22.

EXTRA HEAVY SEMI-STEEL FLANGED REDUCERS

250 POUNDS WORKING STEAM PRESSURE



Flanged Taper Reducers
Fig. 4058



Flanged Eccentric Taper Reducers
Fig. 4059

Prices on Application

PRICE LIST

Size Inches	Diameter of Flanges Inches	Face to Face Inches	Fig. 4058		Size Inches	Diameter of Flanges Inches	Face to Face Inches	Fig. 4058	
			Faced Each	Faced and Drilled Each				Faced Each	Faced and Drilled Each
2½ x 2	7½ x 6½	...	\$ 9.50	\$10.40	12 x 10	20½ x 17½	14	\$ 84.00	\$ 88.50
3 x 2	8½ x 6½	6	10.25	11.35	14 x 6	23 x 12½	16	105.00	110.50
3½ x 2½	9 x 7½	6½	12.25	13.50	14 x 8	23 x 15	16	105.00	110.50
4 x 2	10 x 6½	7	13.50	15.00	14 x 10	23 x 17½	16	105.00	110.50
4 x 2½	10 x 7½	7	13.50	15.00	14 x 12	23 x 20½	16	105.00	110.50
4 x 3	10 x 8½	7	13.50	15.00	15 x 8	24½ x 15	17	120.00	127.00
5 x 2	11 x 6½	8	18.75	20.25	15 x 10	24½ x 17½	17	120.00	127.00
5 x 2½	11 x 7½	8	18.75	20.25	15 x 12	24½ x 20½	17	120.00	127.00
5 x 3	11 x 8½	8	18.75	20.25	15 x 14	24½ x 23	17	120.00	127.00
5 x 4	11 x 10	8	18.75	20.25	16 x 8	25½ x 15	18	135.00	143.00
6 x 3	12½ x 8½	9	22.75	24.75	16 x 10	25½ x 17½	18	135.00	143.00
6 x 3½	12½ x 9	9	22.75	24.75	16 x 12	25½ x 20½	18	135.00	143.00
6 x 4	12½ x 10	9	22.75	24.75	16 x 14	25½ x 23	18	135.00	143.00
6 x 5	12½ x 11	9	22.75	24.75	18 x 10	28 x 17½	19	157.00	166.00
7 x 3	14 x 8½	10	31.50	33.75	18 x 12	28 x 20½	19	157.00	166.00
7 x 4	14 x 10	10	31.50	33.75	18 x 14	28 x 23	19	157.00	166.00
7 x 5	14 x 11	10	31.50	33.75	18 x 16	28 x 25½	19	157.00	166.00
7 x 6	14 x 12½	10	31.50	33.75	20 x 12	30½ x 20½	20	180.00	190.00
8 x 3	15 x 8½	11	36.00	38.50	20 x 14	30½ x 23	20	180.00	190.00
8 x 4	15 x 10	11	36.00	38.50	20 x 16	30½ x 25½	20	180.00	190.00
8 x 5	15 x 11	11	36.00	38.50	20 x 18	30½ x 28	20	180.00	190.00
8 x 6	15 x 12½	11	36.00	38.50	22 x 14	33 x 23	22	225.00	238.00
10 x 4	17½ x 10	12	57.00	61.00	22 x 16	33 x 25½	22	225.00	238.00
10 x 5	17½ x 11	12	57.00	61.00	22 x 18	33 x 28	22	225.00	238.00
10 x 6	17½ x 12½	12	57.00	61.00	22 x 20	33 x 30½	22	225.00	238.00
10 x 8	17½ x 15	12	57.00	61.00	24 x 16	36 x 25½	24	285.00	300.00
12 x 5	20½ x 11	14	84.00	88.50	24 x 18	36 x 28	24	285.00	300.00
12 x 6	20½ x 12½	14	84.00	88.50	24 x 20	36 x 30½	24	285.00	300.00
12 x 8	20½ x 15	14	84.00	88.50	24 x 22	36 x 33	24	285.00	300.00

Flanged Taper Reducers of any other dimensions, will be made to order at a special price.

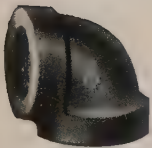
Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling template, see page 461.

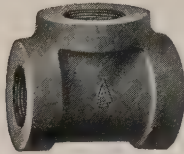
For dimensions, see page 444.

**EXTRA HEAVY SEMI-STEEL
SCREWED FITTINGS**

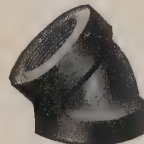
250 POUNDS WORKING STEAM PRESSURE



**90° Elbow
Fig. 468**



**Tee
Fig. 469**



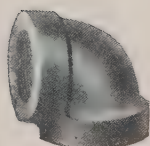
**45° Elbow
Fig. 470**

PRICE LIST

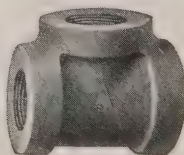
Size Inches	Elbows Each	45° Elbows Each	Tees Each	Reducing Tees Each	Crosses Each
$\frac{1}{2}$	\$0.25	\$0.35	\$0.40	.....	.....
$\frac{3}{4}$	.30	.40	.45	.....	.....
1	.35	.44	.55	\$0.70	\$0.70
$1\frac{1}{4}$	.45	.55	.70	.90	.90
$1\frac{1}{2}$	.60	.70	.90	1.15	1.20
2	.75	.90	1.15	1.40	1.50
$2\frac{1}{2}$	1.25	1.50	1.80	2.25	2.50
3	2.00	2.50	3.00	3.75	4.00
4	3.50	4.50	5.50	6.85	7.00
5	5.50	6.75	8.25	10.25	11.00
6	8.00	9.75	12.00	15.00	16.00
7	12.00	14.50	18.00	22.50	24.00
8	17.00	21.00	25.00	31.00	34.00
10	28.00	34.00	42.00	52.00	56.00
12	40.00	48.00	60.00	75.00	80.00

For dimensions, see page 445.

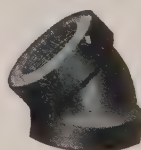
**EXTRA HEAVY ROUGH BRASS
SCREWED FITTINGS
250 POUNDS WORKING STEAM PRESSURE**



**90° Elbow
Fig. 483**



**Tee
Fig. 484**



**45° Elbow
Fig. 485**

PRICE LIST

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Elbows.....each	\$.45	\$.65	\$1.00	\$1.50	\$2.25	\$3.00	\$4.50	\$8.00	\$11.25	\$16.00	\$22.00
Elbows, Reducing.....each	.55	.75	1.20	1.80	2.60	3.50	5.25	9.00	13.00	19.00	25.00
Elbows, 45°.....each	.55	.75	1.10	1.65	2.50	3.25	4.50	8.00	11.25	16.00	22.00
Tees.....each	.60	.90	1.35	2.00	3.00	4.00	6.00	10.75	15.00	22.00	30.00
Tees, Reducing ea.	.70	1.05	1.55	2.30	3.50	4.50	6.75	12.00	17.00	25.00	35.00

For dimensions, see page 446.

EXTRA HEAVY BLIND FLANGES

SEMI-STEEL

250 POUNDS WORKING STEAM PRESSURE

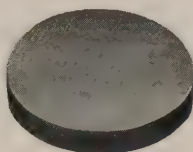


Fig. 4173

PRICE LIST

Size of Valve or Fitting and O. D. of Flange Inches	Faced Each	Faced and Drilled Each
1½ x 6	\$ 1.65	\$ 2.00
2 x 6½	1.90	2.25
2½ x 7½	2.10	2.45
3 x 8¼	2.40	2.85
3½ x 9	3.00	3.55
4 x 10	3.35	4.05
4½ x 10½	3.60	4.30
5 x 11	4.00	4.70
6 x 12½	5.00	5.75
7 x 14	6.60	7.50
8 x 15	7.65	8.70
9 x 16¼	9.50	10.70
10 x 17½	11.00	12.50
12 x 20½	16.00	17.75
14 x 23	22.50	24.50
15 x 24½	28.50	31.00
16 x 25½	33.50	36.25
18 x 28	39.00	42.00
20 x 30½	46.00	50.00
22 x 33	54.00	59.00
24 x 36	67.00	72.00

Extra for male and female, spotfacing, and wooden protectors, see page 187.
For drilling template, see page 461.

EXTRA HEAVY SCREWED FLANGES
250 POUNDS WORKING STEAM PRESSURE
SEMI-STEEL
350 POUNDS WORKING STEAM PRESSURE
CAST STEEL FORGED STEEL

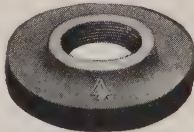


Fig. 462

PRICE LIST

Size Inches	Semi-Steel		Semi-Steel		Cast Steel		Forged Steel		Thread- ing Pipe and Making On but Not In- cluding Flange Net
	Faced Each	Faced and Drilled Each	Flange Includ- ing Bolts and Bolting		Faced Each	Faced Drilled and Spot Faced Each	Faced Each	Faced and Drilled Each	
1 x 4 1/2	\$ 0.95	\$ 1.30	1	\$1.95	\$ 5.00	\$ 6.50	\$ 7.50	\$ 8.00	\$.60
1 1/4 x 5	1.00	1.35	1 1/4	2.05	5.40	7.00	8.40	9.00	.60
1 1/2 x 6	1.10	1.45	1 1/2	2.27	5.90	7.50	9.40	10.00	.65
2 x 6 1/2	1.25	1.60	2	2.42	6.90	8.50	10.40	11.00	.70
2 1/2 x 7 1/2	1.40	1.75	2 1/2	2.80	7.30	9.50	11.80	13.00	.75
3 x 8 1/4	1.60	2.05	3	3.90	8.70	12.00	13.70	15.00	.85
3 1/2 x 9	2.00	2.55	3 1/2	4.45	12.10	15.50	17.60	19.00	.90
4 x 10	2.25	2.95	4	4.85	14.80	18.50	18.30	20.00	.95
4 1/2 x 10 1/2	2.40	3.10	4 1/2	5.00	15.80	19.50	20.30	22.00	1.00
5 x 11	2.65	3.35	5	5.35	16.80	20.50	22.30	24.00	1.10
6 x 12 1/2	3.30	4.05	6	6.95	20.40	25.00	25.40	27.00	1.25
7 x 14	4.40	5.30	7	8.95	24.70	30.50	27.20	32.00	1.35
8 x 15	5.10	6.15	8	9.95	27.00	33.00	32.00	35.00	1.55
9 x 16 1/4	6.30	7.50	9	12.50	29.50	35.50	37.00	40.00	1.80
10 x 17 1/2	7.40	8.90	10	15.60	34.50	41.50	45.00	48.00	2.00
12 x 20 1/2	10.75	12.50	12	22.30	46.00	54.00	56.00	60.00	2.75
14 x 23	15.00	17.00	....	....	55.50	65.00	75.50	80.00	3.50
15 x 24 1/2	19.00	21.50	....	....	64.00	75.00	84.00	90.00	3.75
16 x 25 1/2	22.25	25.00	....	....	78.00	90.00	93.00	100.00	4.75
18 x 28	26.00	29.00	....	....	98.00	111.00	118.00	125.00	7.00
20 x 30 1/2	31.00	35.00	....	....	117.00	131.00	142.00	150.00	8.25
22 x 33	36.00	41.00	....	....	140.00	157.00	.....	.....	9.50
24 x 36	45.00	50.00	....	....	165.00	182.00	.....	.....	11.00

Cast Steel Flanges when ordered faced and drilled, will always be furnished with bolt holes spotfaced at the prices listed above.
Furnished faced only, unless otherwise ordered.
Bolts per set for one joint, see price list, page 189.
Extra prices for special facing, bolting on and for wooden protectors, see page 187.
For drilling template, see page 461. For dimensions, see page 447.
For description, see page 43.

EXTRA HEAVY SCREWED REDUCING FLANGES

SEMI-STEEL

250 POUNDS WORKING STEAM PRESSURE

PRICE LIST

Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1 1/4 x 6	\$1.80	\$2.15	3 x 12 1/2	\$ 5.50	\$ 6.25	10 x 20 1/2	\$17.50	\$19.25
1 1/2 x 6 1/2	2.10	2.45	4 x 12 1/2	5.50	6.25	8 x 23	25.00	27.00
1 1/2 x 7 1/2	2.30	2.65	4 1/2 x 12 1/2	5.50	6.25	9 x 23	25.00	27.00
2 x 7 1/2	2.30	2.65	5 x 12 1/2	5.50	6.25	10 x 23	25.00	27.00
1 1/2 x 8 1/4	2.65	3.10	4 1/2 x 14	7.25	8.15	12 x 23	25.00	27.00
2 x 8 1/4	2.65	3.10	5 x 14	7.25	8.15	8 x 24 1/2	31.50	34.00
2 1/2 x 8 1/4	2.65	3.10	6 x 14	7.25	8.15	10 x 24 1/2	31.50	34.00
2 x 9	3.30	3.85	3 x 15	8.40	9.45	12 x 24 1/2	31.50	34.00
2 1/2 x 9	3.30	3.85	3 1/2 x 15	8.40	9.45	14 x 24 1/2	31.50	34.00
3 x 9	3.30	3.85	4 x 15	8.40	9.45	10 x 25 1/2	37.00	39.75
2 x 10	3.70	4.40	5 x 15	8.40	9.45	12 x 25 1/2	37.00	39.75
2 1/2 x 10	3.70	4.40	6 x 15	8.40	9.45	14 x 25 1/2	37.00	39.75
3 x 10	3.70	4.40	7 x 15	8.40	9.45	15 x 25 1/2	37.00	39.75
3 1/2 x 10	3.70	4.40	4 x 16 1/4	10.50	11.70	12 x 28	43.00	46.00
2 x 10 1/2	4.00	4.70	5 x 16 1/4	10.50	11.70	14 x 28	43.00	46.00
2 1/2 x 10 1/2	4.00	4.70	6 x 16 1/4	10.50	11.70	15 x 28	43.00	46.00
3 x 10 1/2	4.00	4.70	7 x 16 1/4	10.50	11.70	16 x 28	43.00	46.00
3 1/2 x 10 1/2	4.00	4.70	8 x 16 1/4	10.50	11.70	14 x 30 1/2	51.00	55.00
4 x 10 1/2	4.00	4.70	5 x 17 1/2	12.00	13.50	15 x 30 1/2	51.00	55.00
2 x 11	4.40	5.10	6 x 17 1/2	12.00	13.50	16 x 30 1/2	51.00	55.00
2 1/2 x 11	4.40	5.10	7 x 17 1/2	12.00	13.50	18 x 30 1/2	51.00	55.00
3 x 11	4.40	5.10	8 x 17 1/2	12.00	13.50	16 x 33	60.00	65.00
3 1/2 x 11	4.40	5.10	9 x 17 1/2	12.00	13.50	18 x 33	60.00	65.00
4 x 11	4.40	5.10	6 x 20 1/2	17.50	19.25	20 x 33	60.00	65.00
4 1/2 x 11	4.40	5.10	7 x 20 1/2	17.50	19.25	18 x 36	74.00	79.00
2 x 12 1/2	5.50	6.25	8 x 20 1/2	17.50	19.25	20 x 36	74.00	79.00
2 1/2 x 12 1/2	5.50	6.25	9 x 20 1/2	17.50	19.25	.....	.....	.....

Bolts per set for one joint, see price list, page 189.

Extra for male and female, spotfacing, and wooden protectors, see page 187.

For drilling template, see page 461.

For dimensions, see page 447.

For description, see page 43.

EXTRA HEAVY FLANGE UNIONS

SCREWED—SEMI-STEEL

250 POUNDS—AMERICAN STANDARD

PRICE LIST

Including Bolts, but without Gasket

Size Inches	Each	Size Inches	Each
1	\$3.25	4½	\$ 8.10
1¼	3.40	5	8.70
1½	3.72	6	11.00
2	4.02	7	14.25
2½	4.55	8	17.10
3	5.95	9	20.00
3½	7.00	10	24.50
4	7.80	12	34.80

For dimensions, see page 447.

EXTRA HEAVY ROUGH BRASS UNIONS

250 POUNDS WORKING STEAM PRESSURE

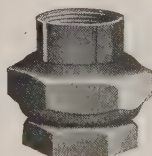


Fig. 481

PRICE LIST

Size .....inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Each	\$1.10	\$1.40	\$1.60	\$1.85	\$3.00	\$4.00	\$5.25	\$7.50	\$10.00	\$15.00

For dimensions, see page 452.

EXTRA HEAVY SCREWED CAST STEEL REDUCING FLANGES

350 POUNDS WORKING STEAM PRESSURE

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spot Faced	Size Inches	Faced Each	Faced, Drilled and Spot Faced	Size Inches	Faced Each	Faced, Drilled and Spot Faced
1½ x 7½	\$10.80	\$13.00	4 x 12½	\$30.90	\$35.50	10 x 20½	\$70.00	\$78.00
2 x 7½	10.80	13.00	4½ x 12½	30.90	35.50	8 x 23	85.00	95.00
1½ x 8¼	12.70	16.00	5 x 12½	30.90	35.50	9 x 23	85.00	95.00
2 x 8¼	12.70	16.00	4½ x 14	36.70	42.50	10 x 23	85.00	95.00
2½ x 8¼	12.70	16.00	5 x 14	36.70	42.50	12 x 23	85.00	95.00
2 x 9	18.10	21.50	6 x 14	36.70	42.50	8 x 24½	94.00	105.00
2½ x 9	18.10	21.50	3 x 15	40.00	46.00	10 x 24½	94.00	105.00
3 x 9	18.10	21.50	3½ x 15	40.00	46.00	12 x 24½	94.00	105.00
2 x 10	21.80	25.50	4 x 15	40.00	46.00	14 x 24½	94.00	105.00
2½ x 10	21.80	25.50	5 x 15	40.00	46.00	10 x 25½	115.00	127.00
3 x 10	21.80	25.50	6 x 15	40.00	46.00	12 x 25½	115.00	127.00
3½ x 10	21.80	25.50	7 x 15	40.00	46.00	14 x 25½	115.00	127.00
2 x 10½	23.80	27.50	4 x 16¼	44.00	50.00	15 x 25½	115.00	127.00
2½ x 10½	23.80	27.50	5 x 16¼	44.00	50.00	12 x 28	145.00	158.00
3 x 10½	23.80	27.50	6 x 16¼	44.00	50.00	14 x 28	145.00	158.00
3½ x 10½	23.80	27.50	7 x 16¼	44.00	50.00	15 x 28	145.00	158.00
4 x 10½	23.80	27.50	8 x 16¼	44.00	50.00	16 x 28	145.00	158.00
2 x 11	24.80	28.50	5 x 17½	52.00	59.00	14 x 30½	175.00	189.00
2½ x 11	24.80	28.50	6 x 17½	52.00	59.00	15 x 30½	175.00	189.00
3 x 11	24.80	28.50	7 x 17½	52.00	59.00	16 x 30½	175.00	189.00
3½ x 11	24.80	28.50	8 x 17½	52.00	59.00	18 x 30½	175.00	189.00
4 x 11	24.80	28.50	9 x 17½	52.00	59.00	16 x 33	210.00	227.00
4½ x 11	24.80	28.50	6 x 20½	70.00	78.00	18 x 33	210.00	227.00
2 x 12½	30.90	35.50	7 x 20½	70.00	78.00	20 x 33	210.00	227.00
2½ x 12½	30.90	35.50	8 x 20½	70.00	78.00	18 x 36	250.00	267.00
3 x 12½	30.90	35.50	9 x 20½	70.00	78.00	20 x 36	250.00	267.00

Cast Steel Reducing Companion Flanges when ordered faced and drilled, will always be furnished with spotfaced bolt holes.

Extra for wooden protectors, see page 187.

For drilling template, see page 461.

For dimensions, see page 447.

For description, see page 43.

EXTRA HEAVY SHRUNK FLANGES
CAST STEEL. FORGED STEEL.
WORKING STEAM PRESSURES UP TO 350 POUNDS

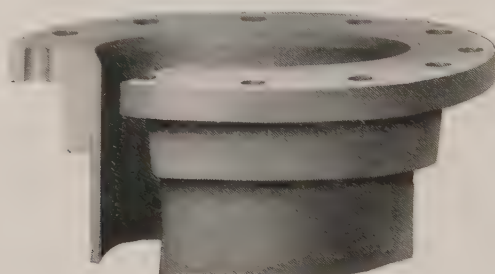


Fig. 4070

PRICE LIST

Size Inches	Cast Steel		Forged Steel	
	Faced and Drilled but not Bored Each	Boring, Shrinking on Pipe and Refacing, Not In- cluding Flange Each	Faced and Drilled but not Bored Each	Boring, Shrinking on Pipe and Refacing, Not In- cluding Flange Each
4 x 10	\$18.00	\$11.00	.....	.....
4½ x 10½	20.00	11.00	.....	.....
5 x 11	22.00	11.00	.....	.....
6 x 12½	25.00	11.00	\$27.00	\$11.00
7 x 14	30.00	13.00	32.00	13.00
8 x 15	35.00	14.00	37.00	14.00
9 x 16½	40.00	15.00	42.00	15.00
10 x 17½	45.00	16.00	47.00	16.00
12 x 20½	55.00	16.00	65.00	16.00
14 x 23	70.00	16.00	80.00	16.00
15 x 24½	80.00	16.00	95.00	16.00
16 x 25½	90.00	17.00	105.00	17.00
18 x 28	110.00	19.00	125.00	19.00
20 x 30½	130.00	20.00	150.00	20.00
22 x 33	150.00	22.00	.....	.....
24 x 36	175.00	25.00	.....	.....

*Cast Steel Flanges, when ordered faced and drilled, will always be furnished with bolt holes spotted, at an extra charge of five cents each net per hole, unless otherwise ordered.

Extra prices for special facing, bolting on and for wooden protectors, see page 187.

For drilling template, see page 461.

For description, see page 44.

For dimensions, see pages 449 to 451.

EXTRA HEAVY ATWOOD FLANGES

250 POUNDS WORKING STEAM PRESSURE
SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE
CAST STEEL, FORGED STEEL.

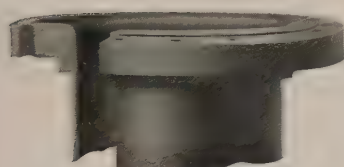


Fig. 4071. Low Hub

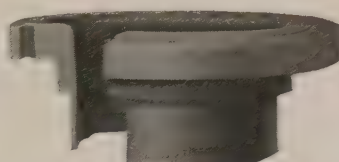


Fig. 4072. High Hub

PRICE LIST

Size	inches	4x10	4 1/2x10 1/2	5x11	6x12 1/2	7x14	8x15	9x16 1/8	10x17 1/2
Semi-Steel with Long Hub Faced and Drilled. Placed on Pipe and Refaced	each	\$21.00	\$22.25	\$23.50	\$24.75	\$29.25	\$32.75	\$36.25	\$38.50
Steel with Short Hub Faced and Drilled. Placed on Pipe and Refaced	each	29.00	31.00	33.00	36.00	43.00	49.00	55.00	61.00
Forged Steel with Long Hub Faced and Drilled. Placed on Pipe and Refaced	each	31.00	33.00	35.00	38.00	45.00	51.00	57.00	63.00

Size	inches	12x20	14x23	15x24 1/2	16x25	18x28	20x30 1/2	22x33	24x36
Semi-Steel with Long Hub Faced and Drilled. Placed on Pipe and Refaced	each	\$46.00	\$52.00	\$56.00	\$62.00	\$71.50	\$82.50	\$102.00	\$120.00
Steel with Short Hub Faced and Drilled. Placed on Pipe and Refaced	each	71.00	86.00	96.00	107.00	129.00	150.00	172.00	200.00
Forged Steel with Long Hub Faced and Drilled. Placed on Pipe and Refaced	each	81.00	96.00	111.00	122.00	144.00	170.00		

When figuring size for Atwood joints, 3 inches should be added for each flange on account of bolt holes.

All cast steel flanges, when ordered faced and drilled, will always be furnished with bolt holes up to 1/2 inch in diameter, at the rate of five cents each net per hole, unless otherwise ordered.

Bolts for Atwood Joints will be proportionately longer than for other style joints; prices on application.

For drilling template, see page 461.

For dimensions, see page 44.

Plans for Atwood connections, see page 127.

For dimensions, see pages 449 to 450.

EXTRA HEAVY WELDED FLANGES
350 POUNDS WORKING STEAM PRESSURE
STEEL

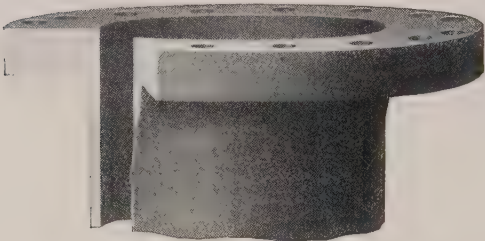


Fig. 4073

PRICE LIST

Size.....inches	3½x9	4x10	4½x10½	5x11	6x12½	7x14	8x15	9x16¼	10x17½
Welded, Refaced, but not Drilled, .....per end									
Welded, Refaced and Drilled.....per end									
	Prices on Application.								

Size.....inches	12x20½	14x23	15x24½	16x25½	18x28	20x30½	22x33	24x36
Welded, Refaced, but not Drilled, .....per end								
Welded, Refaced and Drilled.....per end								
	Prices on Application.							

For drilling template, see page 461.
For description, see page 45.
For dimensions, see page 451.

EXTRA HEAVY EXPANDED FLANGES

350 POUNDS WORKING STEAM PRESSURE



Fig. 4074

PRICE LIST

Size.....inches	4x10	4½x10½	5x11	6x12½	7x14	8x15	9x16¼	10x17½
Forged Steel with Long Hub Faced and Drilled, Placed on Pipe and Refaced.....each	\$31.00	\$33.00	\$35.00	\$38.00	\$45.00	\$51.00	\$57.00	\$63.00

Size.....inches	12x20½	14x23	15x24½	16x25½	18x28	20x30½	22x33	24x36
Forged Steel with Long Hub Faced and Drilled, Placed on Pipe and Refaced.....each	\$81.00	\$96.00	\$111.00	\$122.00	\$144.00	\$170.00	.....	.....

Extra for wooden protectors, see page 187.

For drilling template, see page 461.

For description, see page 45.

For dimensions, see page 451.

DRILLING

MEDIUM AND EXTRA HEAVY FLANGED VALVES

PRICE LIST

Pipe Size Inches	Drilling Valves with Two Flanges Except Angle Valves Each	Drilling Angle Valves Each	Drilling Cross Valves Each
1	\$0.60	\$1.00	....
1¼	.60	1.00	....
1½	.60	1.00	....
2	.75	1.25	\$1.50
2½	.75	1.25	1.50
3	.75	1.25	1.50
3½	1.00	1.50	2.00
4	1.25	1.75	2.50
4½	1.50	2.00	3.00
5	1.50	2.00	3.00
6	1.75	2.50	3.50
7	2.25	3.00	4.50
8	2.25	3.00	4.50
9	2.50	3.50	5.00
10	2.50	3.50	5.00
12	3.50	5.00	7.00
14	4.00	6.00	8.00
15	4.00	6.00	8.00
16	5.00	7.00	....
18	6.00	....	....
20	7.50	....	....
22	9.00	....	....
24	10.00	....	....
30	12.00	....	....

Extra prices for special facing, see page 188.

**SPECIAL FACINGS, PROTECTORS, ETC.
FOR EXTRA HEAVY COMPANION FLANGES
NET PRICE LIST**

Size Inches	Extra for Male or Female Face Per Flange (Semi-Steel)	Extra for Spotfacing Bolt Holes Per Flange (Semi-Steel)	Extra for Wooden Pro- tectors, Bolted on with 2 Small Bolts, In- cluding the 2 Bolts Per Flange
1 x 4½	\$0.50	\$0.20	\$0.20
1¼ x 5	.50	.20	.20
1½ x 6	.50	.20	.20
2 x 6½	.50	.20	.20
2½ x 7½	.65	.20	.20
3 x 8¼	.65	.40	.25
3½ x 9	.65	.40	.25
4 x 10	.65	.40	.25
4½ x 10½	.65	.40	.25
5 x 11	.65	.40	.25
6 x 12½	.80	.60	.25
7 x 14	.80	.60	.30
8 x 15	1.00	.60	.30
9 x 16¼	1.00	.60	.30
10 x 17½	1.00	.80	.35
12 x 20½	1.25	.80	.35
14 x 23	1.60	1.00	.40
15 x 24½	1.60	1.00	.40
16 x 25½	2.00	1.00	.45
18 x 28	2.50	1.20	.45
20 x 30½	3.00	1.20	.50
22 x 33	4.00	1.40	.50
24 x 36	5.00	1.40	.50

SPECIAL FACINGS, PROTECTORS, ETC.

FOR SEMI-STEEL FLANGED FITTINGS

FOR 250 POUNDS WORKING STEAM PRESSURE

EXTRA NET PRICE LIST

Size Inches	Male or Female Tongued or Grooved			Bolting on Companion Flanges Not Including Bolts or Gaskets For Labor Only			Furnishing and Bolting on Wooden Protectors Including 2 Bolts		
	Extra for Fitting or Valve with Two Flanges Each	Extra for Fitting or Valve with Three Flanges Each	Extra for Fitting with Four Flanges Each	Extra for Fitting or Valve with Two Flanges Each	Extra for Fitting or Valve with Three Flanges Each	Extra for Fitting with Four Flanges Each	Extra for Fitting or Valve with Two Flanges Each	Extra for Fitting or Valve with Three Flanges Each	Extra for Fitting with Four Flanges Each
1¼&1½	\$1.00	\$1.25	\$1.75	\$0.20	\$0.30	\$0.40	\$0.40	\$0.60	\$0.80
2	1.00	1.75	2.25	.20	.30	.40	.40	.60	.80
2½	1.25	1.75	2.25	.20	.30	.40	.40	.60	.80
3 to 5	1.25	1.75	2.25	.30	.45	.60	.50	.75	1.00
6	1.50	2.00	2.50	.40	.60	.80	.50	.75	1.00
7	1.50	2.00	2.50	.40	.60	.80	.60	.90	1.20
8 & 9	2.00	2.50	3.00	.40	.60	.80	.60	.90	1.20
10	2.00	2.50	3.00	.40	.60	.80	.70	1.05	1.40
12	2.50	3.00	3.50	.50	.75	1.00	.70	1.05	1.40
14 & 15	3.25	4.00	5.00	.50	.75	1.00	.80	1.20	1.60
16	4.00	5.00	6.00	.50	.75	1.00	.90	1.35	1.80
18	5.00	6.25	7.50	.50	.75	1.00	.90	1.35	1.80
20	6.00	7.50	9.00	.50	.75	1.00	1.00	1.50	2.00
22	8.00	10.00	10.00	.50	.75	1.00	1.00	1.50	2.00
24	10.00	12.50	12.50	.50	.75	1.00	1.00	1.50	2.00

Spotfacing bolt holes 5 cents net extra for each hole.

The above net prices apply to both straight and reducing sizes.

To avoid mistakes in facing flanges, furnish drawing.

Gaskets will only be furnished when specified and at an extra price.

MACHINE BOLTS

AMERICAN EXTRA HEAVY STANDARD

MANUFACTURERS' STANDARD BOLTS

SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 461

PRICE LIST FOR ONE JOINT

For steam working pressures up to 300 pounds per square inch

Pipe Size Inches	Number of Bolts	Size of Bolts Inches	Per Set Each	Pipe Size Inches	Number of Bolts	Size of Bolts Inches	Per Set Each
1	4	$\frac{1}{2} \times 2\frac{1}{4}$	\$0.20	12	16	$1\frac{1}{8} \times 5\frac{1}{2}$	\$6.35
$1\frac{1}{4}$	4	$\frac{1}{2} \times 2\frac{1}{4}$.20	14	20	$1\frac{1}{8} \times 5\frac{3}{4}$	7.94
$1\frac{1}{2}$	4	$\frac{5}{8} \times 2\frac{1}{2}$.29	15	20	$1\frac{1}{4} \times 6$	10.70
2	4	$\frac{5}{8} \times 2\frac{3}{4}$.31	16	20	$1\frac{1}{4} \times 6$	10.70
$2\frac{1}{2}$	4	$\frac{3}{4} \times 3$.43	18	24	$1\frac{1}{4} \times 6\frac{1}{4}$	12.84
3	8	$\frac{3}{4} \times 3\frac{1}{4}$.91	20	24	$1\frac{3}{8} \times 6\frac{3}{4}$	Prices on Application
$3\frac{1}{2}$	8	$\frac{3}{4} \times 3\frac{1}{2}$	.91	22	24	$1\frac{1}{2} \times 7$
4	8	$\frac{3}{4} \times 3\frac{1}{2}$	1.02	24	24	$1\frac{5}{8} \times 7\frac{1}{2}$	
$4\frac{1}{2}$	8	$\frac{3}{4} \times 3\frac{3}{4}$	1.02	26	28	$1\frac{5}{8} \times 7\frac{1}{2}$	
5	8	$\frac{3}{4} \times 3\frac{3}{4}$	1.02	28	28	$1\frac{5}{8} \times 7\frac{3}{4}$	
6	12	$\frac{3}{4} \times 4$	1.60	30	28	$1\frac{3}{4} \times 8$	
7	12	$\frac{7}{8} \times 4\frac{1}{4}$	2.13	32	28	$1\frac{7}{8} \times 8\frac{1}{2}$	
8	12	$\frac{7}{8} \times 4\frac{1}{2}$	2.23	34	28	$1\frac{7}{8} \times 8\frac{3}{4}$	
9	12	$1 \times 4\frac{3}{4}$	3.08	36	32	$1\frac{7}{8} \times 9$	
10	16	1×5	4.27	..	..	.....

For pressures above 300 pounds, prices on application.

Bolts for Atwood Joints are longer than shown above.

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished, add 10% to above list.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

GASKETS

AMERICAN EXTRA HEAVY FLANGES AND DRILLING

PRICE LIST—FOR ONE JOINT

Pipe Size Inches	Ring Gasket O. D.	Ring Gasket Each	Full Gasket O. D.	Full Gasket Each
1	2 $\frac{3}{4}$	\$0.12	4 $\frac{1}{2}$	\$0.32
1 $\frac{1}{4}$	3 $\frac{1}{4}$	.15	5	.37
1 $\frac{1}{2}$	3 $\frac{7}{8}$	.21	6	.54
2	4 $\frac{3}{8}$	.24	6 $\frac{1}{2}$	.60
2 $\frac{1}{2}$	5 $\frac{1}{8}$	.31	7 $\frac{1}{2}$	.78
3	5 $\frac{7}{8}$	.43	8 $\frac{1}{4}$	.93
3 $\frac{1}{2}$	6 $\frac{1}{2}$	.53	9	1.08
4	7 $\frac{1}{8}$	.58	10	1.32
4 $\frac{1}{2}$	7 $\frac{3}{4}$	.62	10 $\frac{1}{2}$	1.41
5	8 $\frac{1}{2}$	.74	11	1.51
6	9 $\frac{7}{8}$	1.00	12 $\frac{1}{2}$	1.88
7	11	1.13	14	2.31
8	12 $\frac{1}{8}$	1.35	15	2.52
9	13	1.50	16 $\frac{1}{4}$	3.00
10	14 $\frac{1}{4}$	1.75	17 $\frac{1}{2}$	3.24
12	16 $\frac{5}{8}$	2.30	20 $\frac{1}{2}$	4.00
14	19 $\frac{1}{8}$	2.70	23	5.25
15	20 $\frac{1}{4}$	3.00	24 $\frac{1}{2}$	5.90
16	21 $\frac{1}{4}$	3.10	25 $\frac{1}{2}$	6.20
18	23 $\frac{1}{2}$	3.60	28	7.25
20	25 $\frac{5}{8}$	4.10	30 $\frac{1}{2}$	8.40
22	27 $\frac{3}{4}$	4.50	33	9.50
24	30 $\frac{3}{8}$	5.50	36	11.30
26	32 $\frac{7}{8}$	6.40	38 $\frac{1}{4}$	12.40
28	35 $\frac{5}{8}$	7.40	40 $\frac{3}{4}$	13.80

Ring gaskets cover the flange from inside of bolt to inside of fitting. All metallic gaskets are so furnished. Soft gaskets will be furnished "ring" unless specified "full". For drilling template, see page 461.

SUPERHEATED STEAM GATE VALVES

No. 4 S

350 POUNDS WORKING PRESSURE

TEMPERATURE 700°F.

To meet the growing demand for gate valves for this service we have developed a line of Cast Steel Gate Valves. They are of the double disc tapered type as shown on pages 453 and 558, are suitable for working steam pressures up to 350 pounds per square inch and a total temperature of 700 degrees Fahrenheit.

We are prepared to mount these with either monel or nickel steel seats and disc rings and rolled monel, nickel steel or cold rolled steel stems. We strongly recommend the use of monel metal for all mountings as being the best suited to the service.

1½-inch and 2-inch valves are made with solid discs of monel metal.

2½-inch to 4½-inch valves are made with double discs of monel metal.

5-inch valves and larger are made with double discs of cast steel with monel metal disc rings.

Monel metal is not affected by the high temperature of superheated steam and its co-efficient of expansion being so nearly that of steel makes its use in conjunction with steel particularly desirable.

Our steel castings are of a high grade made from patterns designed to produce solid castings. Abrupt changes in the section of metal and sharp corners (see page 193) have been avoided. All steel castings are annealed and thoroughly cleaned.

A cooling chamber of ample size for protection of the packing has been provided under the stuffing-box. This chamber is tapped for a ½-inch valve for the escape of any steam that may leak past the packing collar. This has been found to make repacking much easier and safer.

We have developed a method of attaching a stem to the disc nut, which absolutely guarantees that the disc nut cannot become detached. We can take a stem from any of our stock valves as now made and by applying a torsional strain sufficient to twist off the steel stem, can, and have frequently demonstrated, that the stem itself is ruptured without injuring or detaching the disc.

When gearing is necessary our standard types of bevel and spur gears as shown on pages 532 to 536, can be made to fit almost any condition. If special designs are required these types can be varied to suit.

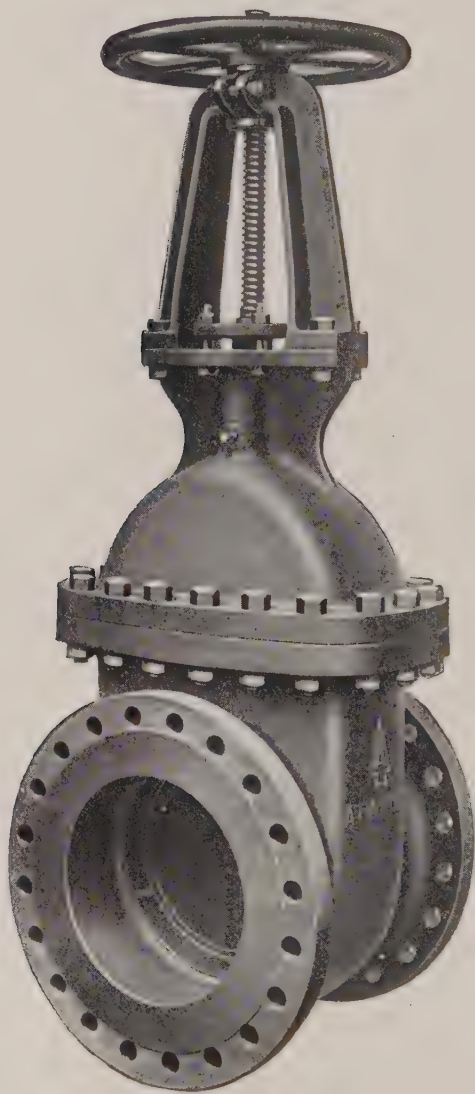
Outside screw and yoke valves are backseated for repacking.

When ordering please give the following information:

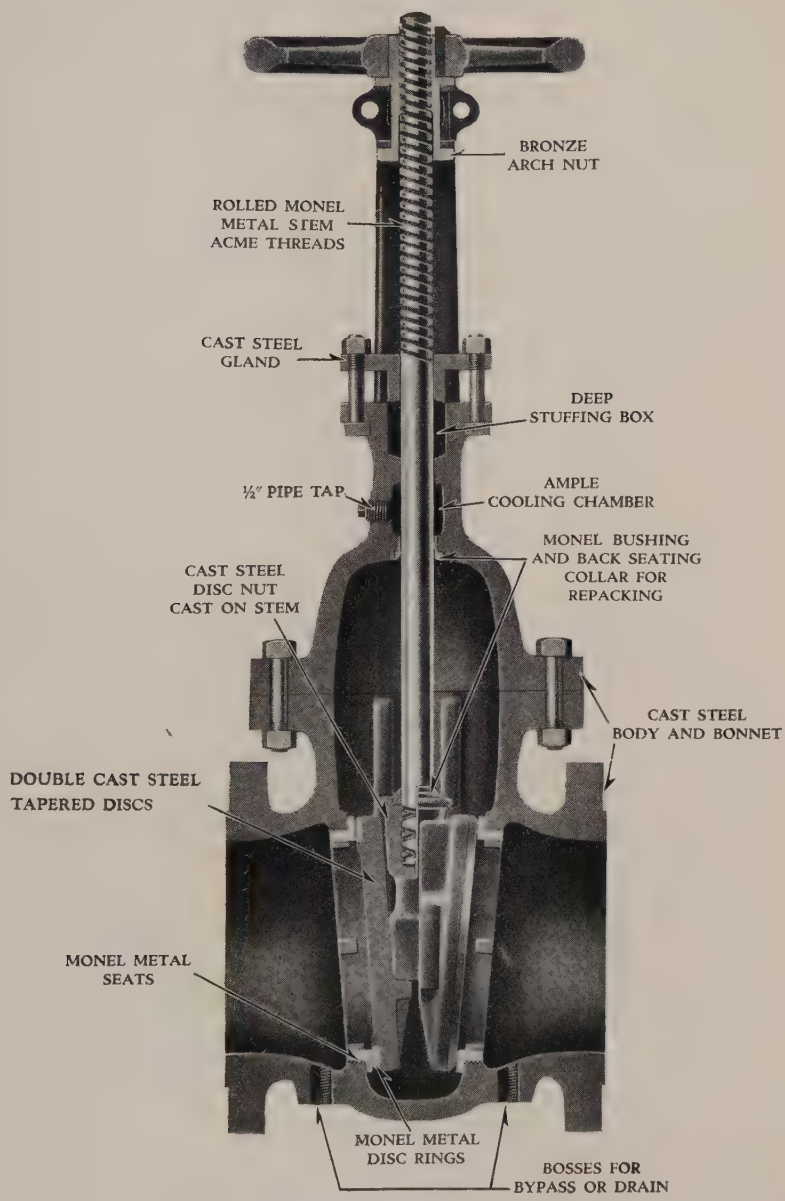
Size. Working pressure. Whether screw or flange ends. Pressure and temperature. Whether gearing is required; if so, type—bevel or spur. Whether by-pass is required. Screwed by-pass will be furnished as shown on page 196.

The flanges on these valves are drilled as shown on page 461.

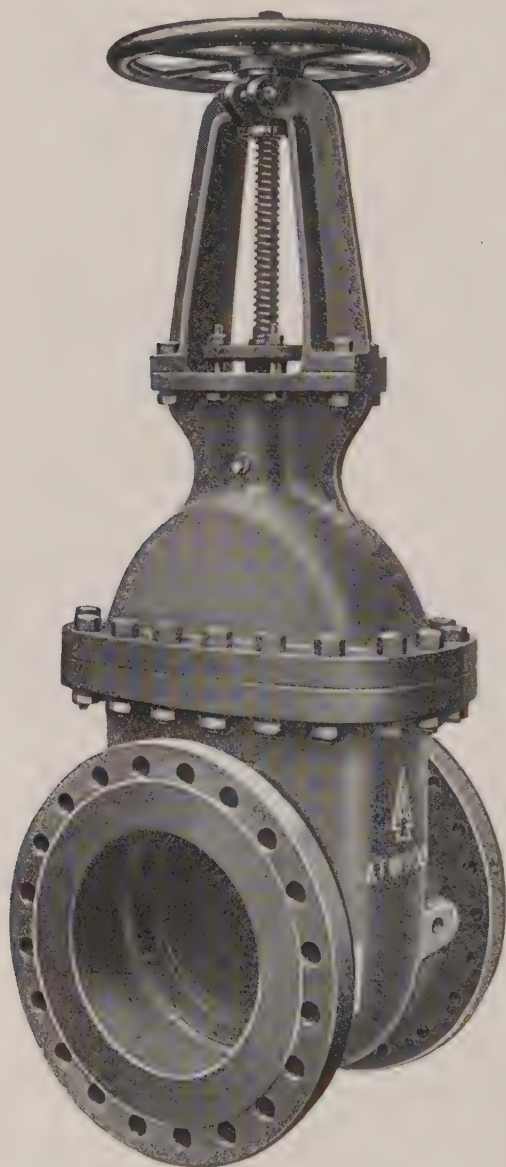
AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.



Cast Steel Gate Valve for High Pressure Superheated
Steam Service



**Interior View of Cast Steel Gate Valve
For High Pressure Superheated Steam Service**



Cast Steel Gate Valve for High Pressure
Superheated Steam Service. Tapped for By-pass

EXTRA HEAVY CAST STEEL GATE VALVES No. 4 S

TAPER SEAT

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE

The mini-
mum open-
ing through
these valves is
100 per cent of
the pipe area.

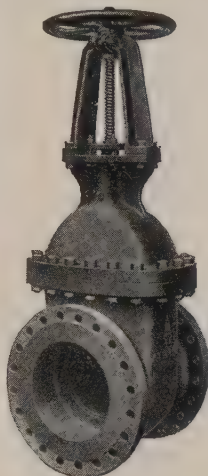


Fig. 4075

PRICE LIST—CAST STEEL O. S. AND Y. GATE VALVES WITHOUT BY-PASS

Size Inches	List No. 1 Each	List No. 2 Each	List No. 3 Each	List No. 4 Each
1¼	\$ 50.00	\$ 45.00	\$ 40.00	\$ 40.00
1½	52.50	47.50	42.50	42.50
2	57.50	50.00	45.00	44.00
2½	70.00	62.50	56.50	55.00
3	85.00	75.00	69.00	67.00
3½	100.00	90.00	78.00	82.00
4	115.00	105.00	90.00	95.00
4½	130.00	120.00	105.00	110.00
5	145.00	135.00	120.00	120.00
6	170.00	155.00	137.00	135.00
7	210.00	190.00	170.00	165.00
8	245.00	225.00	200.00	195.00
9	310.00	285.00	250.00	240.00
10	375.00	340.00	300.00	295.00
12	475.00	435.00	375.00	360.00
14	625.00	560.00	500.00	465.00
15	625.00	560.00	500.00	465.00
16	800.00	720.00	650.00	585.00

Extra for labor attaching companion flanges and wooden protectors, see page 223.

List No. 1—Cast steel body, disc and bonnet, monel metal seat and disc rings, and monel or nickel steel stem.

List No. 2—Cast steel body, disc and bonnet, monel metal seat and disc rings and rolled steel stem.

List No. 3—Cast Steel body and disc, semi-steel bonnet, monel metal seat and disc rings, and rolled steel stem. **For Boiler Feed Service.**

For Lists Nos. 1, 2, and 3—1½ inch and 2 inch valves are made with solid discs of monel metal.

2½ to 4½-inch valves are made with double discs of monel metal.

5-inch valves and larger are made with double discs of cast steel with monel metal disc rings.

List No. 4—Cast steel body, disc and bonnet, bronze seat and disc rings, and rolled steel stem.

Extra for drilling and spotfacing, see page 205. For drilling template, see page 461.

For dimensions, see page 453. For description, see page 191.

For Repair Parts, see pages 558.

EXTRA HEAVY CAST STEEL GATE VALVES No. 4 S

TAPER SEATS

**350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE**

The mini-
mum open-
ing through
these valves is
100 per cent
of the pipe
area.

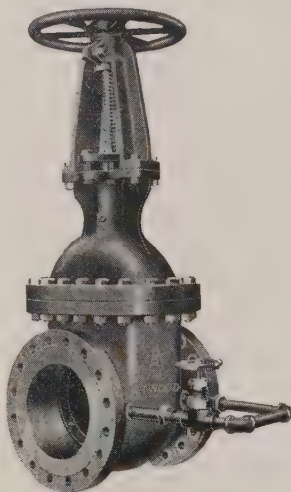


Fig. 4249

PRICE LIST—CAST STEEL O. S. & Y. GATE VALVES WITH BY-PASS

The globe valve and fittings furnished for the By-Pass are Forged Steel screwed, the valve being monel mounted, see page 266.
For Combination By-Pass and Drain, see page 197.

Size Inches	List No. 1 Each	List No. 2 Each	List No. 3 Each	List No. 4 Each
6	\$ 225.00	\$ 205.00	\$ 180.00	\$ 180.00
7	265.00	240.00	215.00	210.00
8	300.00	275.00	245.00	240.00
9	365.00	335.00	300.00	290.00
10	440.00	400.00	350.00	345.00
12	560.00	515.00	440.00	425.00
14	710.00	640.00	565.00	530.00
15	710.00	640.00	565.00	530.00
16	885.00	800.00	715.00	650.00
18	1200.00	1100.00	1000.00	900.00
20	1500.00	1350.00	1225.00	1100.00
22	2000.00	1825.00	1675.00	1525.00
24	2250.00	2050.00	1850.00	1700.00

Flanged By-Pass can be furnished if desired, the screwed By-Pass is recommended.

Extra for labor attaching companion flanges and wooden projectors, see page 223.

List No. 1—Cast steel body, disc and bonnet, monel metal seat and disc rings, and monel or nickel steel stem.

List No. 2—Cast steel body, disc and bonnet, monel metal seat and disc rings, and rolled steel stem.

List No. 3—Cast steel body and disc, semi-steel bonnet, monel metal seat and disc rings, and rolled steel stem. **For Boiler Feed Service.**

For Lists Nos. 1, 2 and 3 1½ inch and 2 inch valves are made with solid discs of monel metal; 2½ to 4½ inch valves are made with double discs of monel metal; 5 inch valves and larger are made with double discs of cast steel with monel metal disc rings.

List No. 4—Cast steel body, disc and bonnet, bronze seat and disc rings, and rolled steel stem.

Extra for drilling and spotfacing, see page 205.

For drilling template, see page 461.

For dimensions, see page 453.

For description, see page 191.

For Repair Parts see page 558.

COMBINATION SCREWED BY-PASS
AND DRAIN

FOR EXTRA HEAVY CAST STEEL GATE VALVES No. 4 S

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE



Fig. 4258

With By-pass as shown, the Gate Valve should be installed with the stem in a Vertical Position, with the By-Pass on the under-side of the valve.

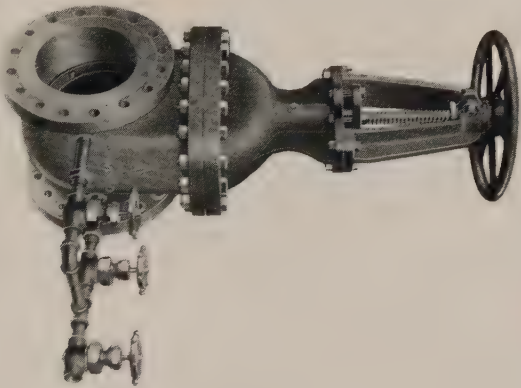


Fig. 4259

With By-pass as shown, the Gate Valve should be installed with the stem in a Horizontal Position, with the By-Pass on the under-side of the valve.

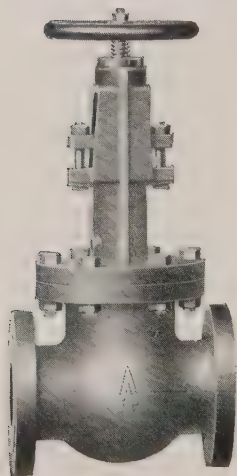
The globe valves and fittings furnished for the By-Pass and Drain are Forged Steel screwed, the valves being monel mounted, see page 226.

Size of Valve inches	6	8	10	12	14	16	18	20	22	24
Size of By-pass inches	3/4	3/4	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2

PRICES ON APPLICATION

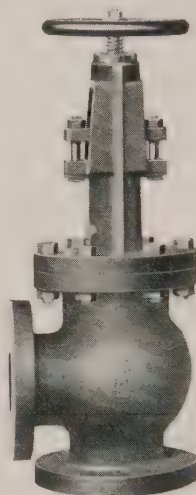
EXTRA HEAVY CAST STEEL GLOBE AND ANGLE VALVES MONEL MOUNTED

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Globe Valve
Fig. 4077

The minimum opening through these valves is 100 per cent of the pipe area.



Angle Valve
Fig. 4078

PRICE LIST

Plain Globe or Angle Valves

Size Inches	List No. 1 Each	List No. 2 Each	List No. 3 Each
2	\$57.50	\$52.50	\$47.50
2½	70.00	62.50	52.50
3	85.00	75.00	65.00
3½	100.00	90.00	77.50
4	115.00	100.00	87.50
4½	130.00	115.00	102.50
5	145.00	125.00	110.00
6	170.00	145.00	127.50
7	210.00	180.00	160.00
8	245.00	210.00	185.00
10	375.00	325.00	290.00

List No. 1—Cast steel body, disc and top, monel seat and disc ring and nickel steel or monel stem.

List No. 2—Same as No. 1, except steel stem.

List No. 3—Cast steel body and disc, semi-steel yoke and steel stem. **For Boiler Feed Service.**

The discs for these valves are monel metal for sizes 7 inches and smaller. For sizes larger than 7 inches the discs are cast steel, monel mounted.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for drilling and spotfacing, see page 205.

Extra for labor attaching companion flanges and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, see page 456.

Due to the large unbalanced pressure, we recommend the use of a by-pass on these valves for sizes larger than 6 inches.

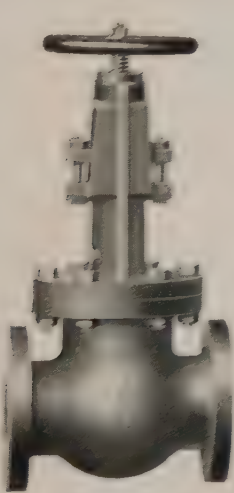
EXTRA HEAVY CAST STEEL
BALANCED THROTTLE VALVES

GLOBE AND ANGLE TYPES
MONEL MOUNTED

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE

The minimum opening through these valves is 100 per cent of the pipe area.



Globe Throttle Valve
Fig. 4174



Angle Throttle Valve
Fig. 4175

PRICE LIST

Size	inches	4	6	8	10	12
Price Fig. 4174		each \$230.00	\$340.00	\$490.00	\$750.00	\$950.00
Fig. 4175						

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

- Extra for drilling and spot facing, see page 295.
- Extra for labour attaching companion flanges and wooden protectors, see page 223.
- For drilling template, see page 461.
- For dimensions, see page 460.

EXTRA HEAVY SWING CHECK VALVES

CAST STEEL. MONEL MOUNTED.

350 POUNDS WORKING PRESSURE

The minimum opening through these valves is 100 per cent of the pipe area.



Fig. 4176

PRICE LIST—FACED ONLY

Size Inches	List Each	Size Inches	List Each
2	\$45.00	6	\$120.00
2½	55.00	7	145.00
3	62.50	8	160.00
3½	72.50	10	275.00
4	85.00	12	325.00
4½	95.00	14	475.00
5	100.00	15	475.00

Valves 4 inches and smaller, discs are furnished of monel metal.

Valves larger than 4 inches, discs are furnished of cast steel monel mounted.

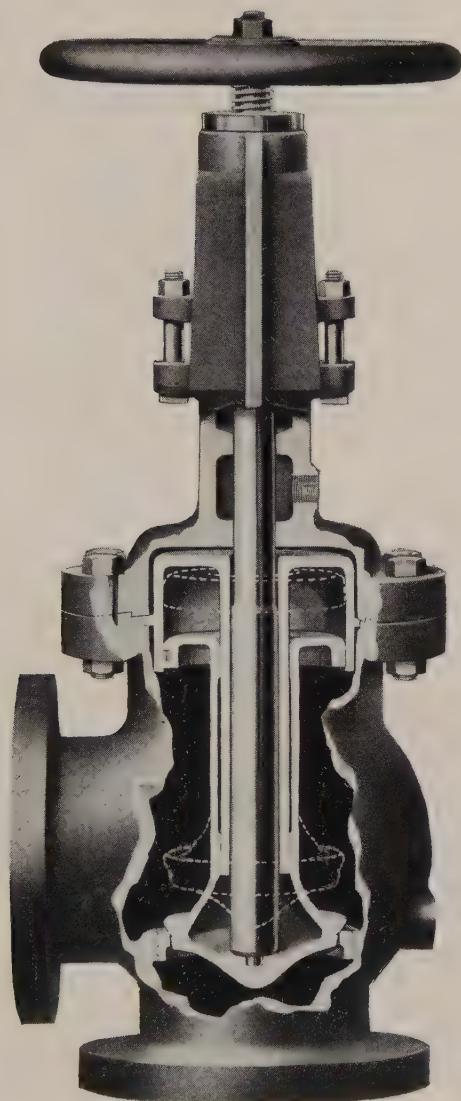
AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for drilling and spotfacing, see page 205.

Extra for labor attaching companion flanges and wooden protectors, see page 223.

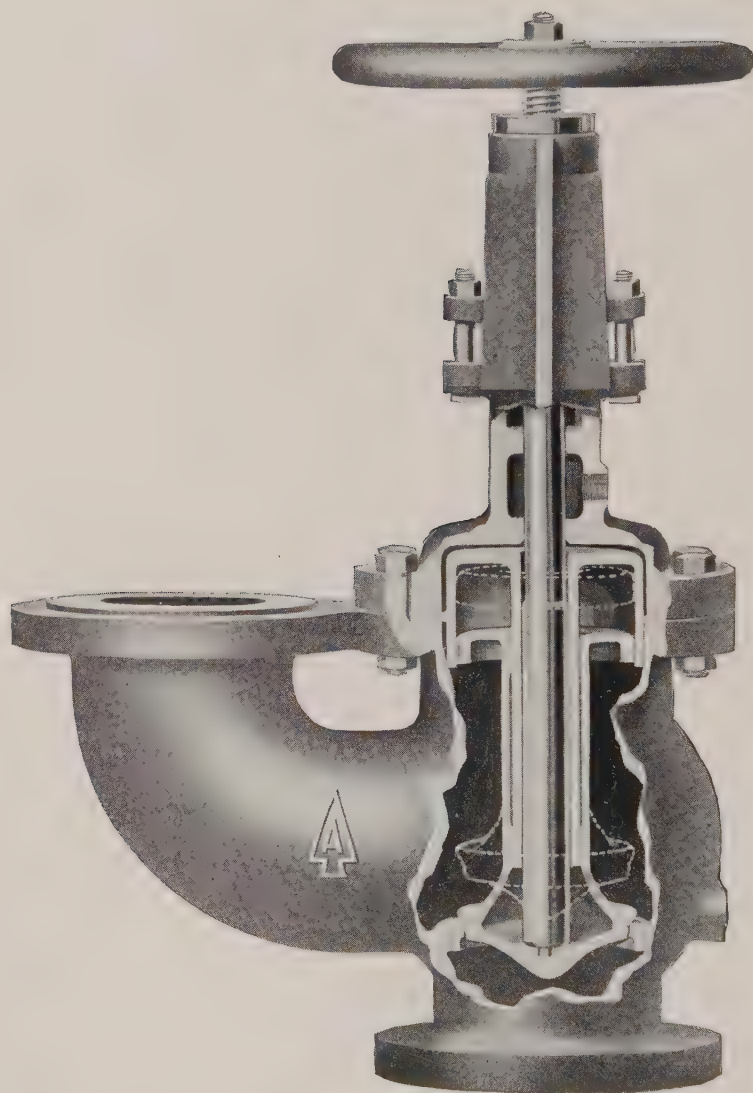
For drilling template, see page 461.

For dimensions, see page 457.



(Patented)

**Cast Steel Balanced Type Non-Return Valve with Monel Mountings,
Cooling Chamber and Relief Plug for High Pressure
Superheated Steam**



(Patented)

**Vertical Cast Steel Balanced Type Non-Return Valve with Monel Mountings,
Cooling Chamber and Relief Plug for High Pressure
Superheated Steam**

**BALANCED TYPE EXTRA HEAVY, CAST
STEEL NON-RETURN VALVES**

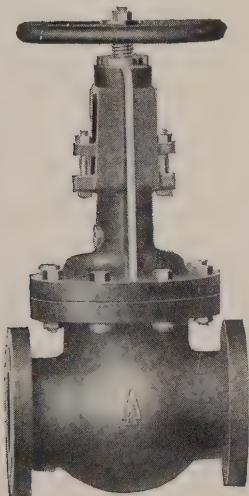
(STOP AND CHECK VALVES)

GLOBE AND ANGLE. MONEL MOUNTED

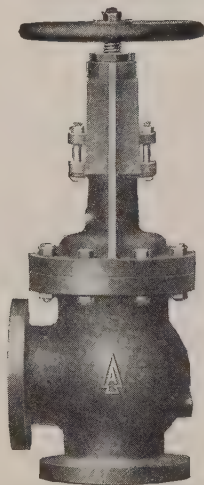
350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE

The minimum opening through these valves is 100 per cent of the pipe area



**Globe Type
Fig. 4080**



**Angle Type
Fig. 4081**

PRICE LIST

Size Inches	Faced Each	Size Inches	Faced Each
4	\$145.00	7	\$265.00
5	175.00	8	340.00
6	220.00	10	525.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 223.

Extra for drilling and spotfacing, see page 205.

For drilling template, see page 461.

For dimensions, see page 458.

For description, see page 139.

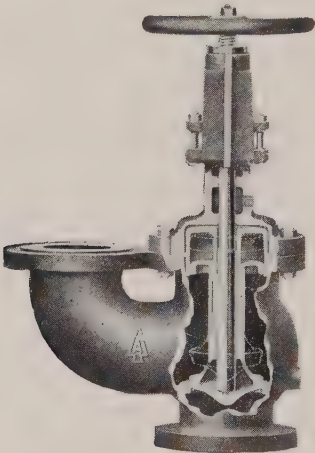
**BALANCED TYPE EXTRA HEAVY, CAST
STEEL NON-RETURN VALVES**

(STOP AND CHECK VALVES)

VERTICAL TYPE. MONEL MOUNTED.

**350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE**

The minimum opening through these valves is 100 per cent of the pipe area.



(Patented)
Fig. 4082

PRICE LIST

Size Inches	Faced Each	Size Inches	Faced Each
4	\$145.00	7	\$265.00
5	175.00	8	340.00
6	220.00	10	525.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 223.

Extra for drilling and spotfacing, see page 205.

For drilling template, see page 461.

For dimensions, see page 459.

For description, see page 139.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

**EXTRA FOR DRILLING AND SPOTFACING
CAST STEEL GATE, GLOBE OR
CHECK VALVES**

PRICE LIST

Size Inches	Drilling and Spotfacing Each	Size Inches	Drilling and Spotfacing Each
1¼	\$2.75	8	\$8.00
1½	2.75	9	9.00
2	3.00	10	10.00
2½	3.25	12	12.00
3	3.75	14	14.00
3½	4.00	15	15.00
4	4.50	16	16.00
4½	4.75	18	20.00
5	5.00	20	25.00
6	6.00	22	30.00
7	7.00	24	33.00

**EXTRA FOR DRILLING AND SPOTFACING
CAST STEEL ANGLE VALVES**

PRICE LIST

Size Inches	Drilling and Spotfacing Each	Size Inches	Drilling and Spotfacing Each
2	\$3.50	5	\$5.50
2½	3.75	6	7.00
3	4.25	7	8.00
3½	4.50	8	9.00
4	5.00	10	11.00
4½	5.25		

EXTRA HEAVY CAST STEEL
STEAM SEPARATORS
VERTICAL AND HORIZONTAL
350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Horizontal Separator
Fig. 4177



Vertical Separator
Fig. 4178

PRICE LIST

Size.....inches	1½	2	2½	3	3½	4	4½
Vertical.....each	\$70.00	\$75.00	\$80.00	\$90.00	\$105.00	\$115.00	\$130.00
Horizontal.....each	70.00	75.00	80.00	90.00	105.00	115.00	130.00

Size.....inches	5	6	7	8	9	10	12
Vertical.....each	\$140.00	\$175.00	\$200.00	\$250.00	\$375.00	\$400.00	\$500.00
Horizontal.....each	140.00	175.00	200.00	250.00	375.00	400.00	500.00

Larger sizes, prices on application.

The above prices include Water Gauge, Drain Valve and Nipple.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, Horizontal, see page 428; Vertical, see page 429.

For description, see page 151.

**EXTRA HEAVY CAST STEEL
STEAM SEPARATORS**
ANGLE TYPE—TOP INLET, SIDE OUTLET
350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Fig. 4179

Prices on Application

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

For drilling template, see page 461.

For dimensions, see page 430.

For description, see page 151.

EXTRA HEAVY CAST STEEL STEAM SEPARATORS

ANGLE TYPE—SIDE INLET, TOP OUTLET

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE



Fig. 4180

Prices on Application

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

For drilling template, see page 461.

For dimensions, see page 431.

For description, see page 151.

STEAM SEPARATORS WITH RECEIVER WELL

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE



Fig. 4181

Prices on Application

These separators are made with cast steel heads and wrought steel wells. See remarks on page 151.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

For dimensions, see page 432.

For drilling template, see page 461.

DRIP POCKETS

EXTRA HEAVY. CAST STEEL

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE

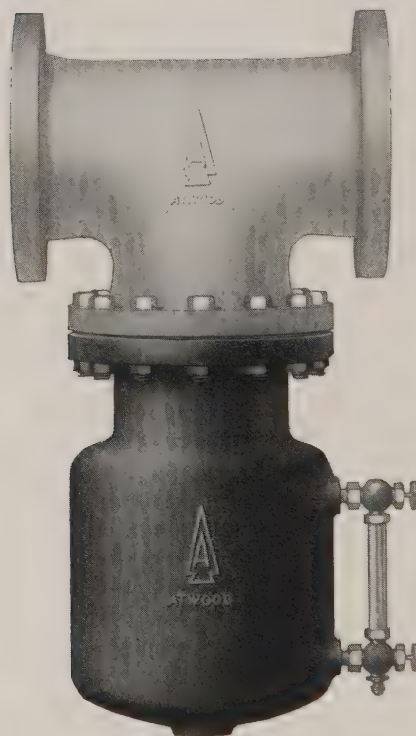


Fig. 4182

PRICE LIST

Size.....inches	2½	3	4	5	6	8	10	12
Faced.....each	\$18.00	\$20.00	\$26.00	\$34.00	\$42.00	\$60.00	\$84.00	\$103.00
Faced and drilled...each	20.00	23.00	29.00	37.00	46.00	65.00	90.00	110.00

A 12-inch drip pocket is the largest size that need be used.

Prices do not include the tee shown in the cut nor the gauge.

For dimensions, see page 437.

For drilling template, see page 461.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Flanged Elbows
Fig. 4083



45° Flanged Elbows
Fig. 4084

PRICE LIST

Size Inches	90° and 45° Elbows		Size Inches	90° and 45° Elbows	
	Faced Each	Faced, Drilled and Spotfaced Each		Faced Each	Faced, Drilled and Spotfaced Each
1¼	\$ 9.00	\$ 11.00	8	\$ 43.00	\$ 48.00
1½	10.00	12.00	9	52.00	57.00
2	11.00	13.00	10	61.00	67.00
2½	13.00	15.00	12	77.00	84.00
3	14.00	17.00	14	100.00	108.00
3½	17.00	20.00	15	112.00	120.00
4	19.00	22.00	16	130.00	140.00
4½	22.00	25.00	18	170.00	180.00
5	24.00	27.00	20	210.00	225.00
6	29.00	33.00	22	270.00	290.00
7	36.00	41.00	24	335.00	355.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 223.

For drilling template, see page 461. For dimensions, see pages 441 and 442.

For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE



Flanged Long Radius Elbows

Fig. 4085

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Size Inches	Faced Each	Faced, Drilled and Spotfaced Each
2	\$14.00	\$17.00	7	\$ 52.00	\$ 59.00
2½	16.00	19.00	8	63.00	70.00
3	18.00	22.00	9	72.00	79.00
3½	22.00	26.00	10	83.00	92.00
4	25.00	29.00	12	105.00	115.00
4½	30.00	34.00	14	145.00	157.00
5	35.00	39.00	15	160.00	172.00
6	42.00	48.00	16	190.00	205.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, see pages 441 and 442.

For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED
FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Square Base Elbows
Fig. 4086



Round Base Elbows
Fig. 4087

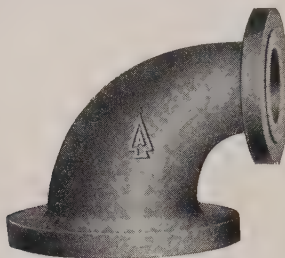
PRICE LIST—ELBOWS WITH BASE

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Drilled and Spotfaced Base Each
4	\$ 28.00	\$ 32.00	\$ 3.00
4½	33.00	37.00	3.00
5	37.00	41.00	3.00
6	44.00	50.00	3.00
7	54.00	61.00	6.00
8	63.00	70.00	6.00
9	76.00	83.00	8.00
10	88.00	97.00	8.00
12	110.00	120.00	10.00
14	148.00	160.00	12.00
15	165.00	177.00	13.00
16	190.00	205.00	15.00

Square Bases will be furnished unless otherwise ordered.
Diameter and drilling of Round Bases correspond with standard flanges.
AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.
Extra for labor attaching companion flanges and wooden protectors, see page 223.
For drilling template, see page 461.
For dimensions, see page 537. For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Flanged Reducing Elbows
Fig. 4088

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Center to Face Inches	Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Center to Face Inches
2 x 1 1/4	\$14.00	\$16.00	5	7 x 5	\$ 43.00	\$ 48.00	9
2 x 1 1/2	14.00	16.00	5	7 x 6	43.00	48.00	9
2 1/2 x 1 1/2	16.00	18.00	5 1/2	8 x 4	51.00	56.00	10
2 1/2 x 2	16.00	18.00	5 1/2	8 x 5	51.00	56.00	10
3 x 1 1/2	17.00	20.00	6	8 x 6	51.00	56.00	10
3 x 2	17.00	20.00	6	8 x 7	51.00	56.00	10
3 x 2 1/2	17.00	20.00	6	10 x 5	73.00	79.00	11 1/2
3 1/2 x 2	21.00	24.00	6 1/2	10 x 6	73.00	79.00	11 1/2
3 1/2 x 2 1/2	21.00	24.00	6 1/2	10 x 8	73.00	79.00	11 1/2
3 1/2 x 3	21.00	24.00	6 1/2	12 x 7	93.00	100.00	13
4 x 2	23.00	26.00	7	12 x 8	93.00	100.00	13
4 x 2 1/2	23.00	26.00	7	12 x 9	93.00	100.00	13
4 x 3	23.00	26.00	7	12 x 10	93.00	100.00	13
4 x 3 1/2	23.00	26.00	7	14 x 6	120.00	128.00	15
5 x 2 1/2	29.00	32.00	8	14 x 10	120.00	128.00	15
5 x 3	29.00	32.00	8	14 x 12	120.00	128.00	15
5 x 4	29.00	32.00	8	15 x 6	135.00	143.00	15 1/2
6 x 3	35.00	39.00	8 1/2	15 x 10	135.00	143.00	15 1/2
6 x 3 1/2	35.00	39.00	8 1/2	15 x 12	135.00	143.00	15 1/2
6 x 4	35.00	39.00	8 1/2	16 x 8	155.00	165.00	16 1/2
6 x 4 1/2	35.00	39.00	8 1/2	16 x 10	155.00	165.00	16 1/2
6 x 5	35.00	39.00	8 1/2	16 x 12	155.00	165.00	16 1/2
7 x 4	43.00	48.00	9	16 x 14	155.00	165.00	16 1/2

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for labor attaching companion flanges and wooden protectors, see page 223.

For drilling template, see page 461.

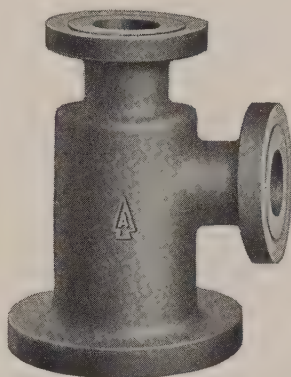
For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

**350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE**



**Flanged Tees
Fig. 4089**



**Reducing Flanged Tees
Fig. 4090**

STRAIGHT AND REDUCING TEES PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Size Inches	Faced Each	Faced, Drilled and Spotface Each
1¼	\$13.00	\$16.00	8	\$ 58.00	\$ 65.00
1½	14.00	17.00	9	69.00	76.00
2	15.00	18.00	10	81.00	90.00
2½	17.00	20.00	12	100.00	110.00
3	19.00	23.00	14	135.00	147.00
3½	22.00	26.00	15	150.00	162.00
4	25.00	29.00	16	175.00	190.00
4½	30.00	34.00	18	230.00	245.00
5	33.00	37.00	20	300.00	320.00
6	40.00	46.00	22	375.00	405.00
7	49.00	56.00	24	460.00	490.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges, and wooden protectors, see page 223.

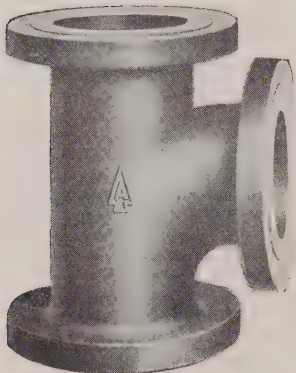
For drilling template, see page 461.

For dimensions, see pages 441 to 443.

For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED
FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Single Sweep Flanged Tees
Fig. 4091



Reducing Single Sweep Flanged Tees
Reducing in Run or Branch
Fig. 4092

EXTRA HEAVY CAST STEEL FLANGED TEES
SINGLE SWEEP—STRAIGHT OR REDUCING

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Size Inches	Faced Each	Faced, Drilled and Spotfaced Each
2	\$16.50	\$19.50	9	\$ 76.00	\$ 83.00
2½	19.00	22.00	10	88.00	97.00
3	21.00	25.00	12	110.00	120.00
3½	24.00	28.00	14	148.00	160.00
4	28.00	32.00	15	165.00	177.00
4½	33.00	37.00	16	190.00	205.00
5	37.00	41.00	18	255.00	270.00
6	44.00	50.00	20	330.00	350.00
7	54.00	61.00	22	415.00	445.00
8	63.00	70.00	24	505.00	535.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, see pages 441 to 443.

For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Double Sweep Flanged Tees
Fig. 4093



Reducing Double Sweep
Flanged Tees
Fig. 4094

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Faced Each	Faced, Drilled and Spotfaced Each
2	\$ 16.50	\$ 19.50		
2½	19.00	22.00	\$ 19.00	\$ 22.00
3	21.00	25.00	21.00	25.00
3½	24.00	28.00	24.00	28.00
4	28.00	32.00	28.00	32.00
4½	33.00	37.00	33.00	37.00
5	37.00	41.00	37.00	41.00
6	44.00	50.00	44.00	50.00
7	54.00	61.00	54.00	61.00
8	63.00	70.00	63.00	70.00
9	76.00	83.00	76.00	83.00
10	88.00	97.00	88.00	97.00
12	110.00	120.00	110.00	120.00
14	148.00	160.00	148.00	160.00
15	165.00	177.00	165.00	177.00
16	190.00	205.00	190.00	205.00
18	255.00	270.00	255.00	270.00
20	330.00	350.00	330.00	350.00
22	415.00	445.00	415.00	445.00
24	505.00	535.00	505.00	535.00

Double Sweep Tees are not made reducing on the run. Should such Tees, however, be wanted, we will alter patterns and charge at a special price.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges, and wooden protectors, see page 223.

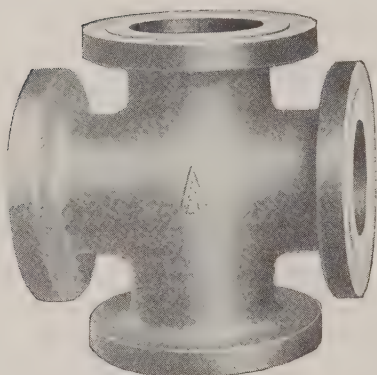
For dimensions, see pages 441 to 443.

For description, see page 22.

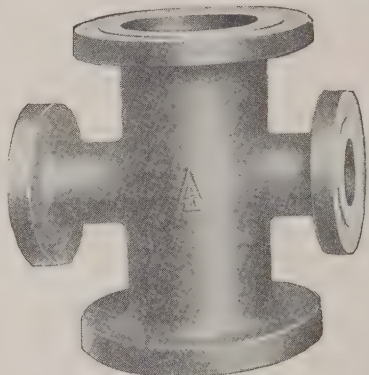
For drilling template, see page 461.

EXTRA HEAVY CAST STEEL FLANGED
FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Flanged Crosses
Fig. 4095



Reducing Flanged Crosses
Fig. 4096

STRAIGHT OR REDUCING CROSSES

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Size Inches	Faced Each	Faced, Drilled and Spotfaced Each
1¼	\$17.00	\$21.00	8	\$ 81.00	\$ 91.00
1½	19.00	23.00	9	100.00	110.00
2	21.00	25.00	10	115.00	127.00
2½	25.00	29.00	12	145.00	160.00
3	27.00	33.00	14	190.00	205.00
3½	32.00	38.00	15	210.00	225.00
4	36.00	42.00	16	245.00	265.00
4½	42.00	48.00	18	320.00	340.00
5	45.00	51.00	20	400.00	430.00
6	55.00	63.00	22	510.00	550.00
7	68.00	78.00	24	635.00	675.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges, and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, see pages 441 to 443.

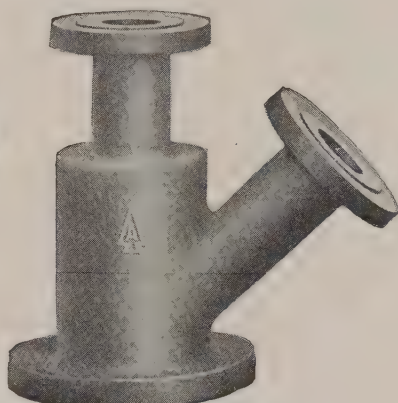
For description, see page 22.

EXTRA HEAVY CAST STEEL FLANGED FITTINGS

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Flanged Laterals
Fig. 4097



Reducing Flanged Laterals
Fig. 4098

STRAIGHT AND REDUCING LATERALS

PRICE LIST

Size Inches	Faced Each	Faced, Drilled and Spotfaced Each	Size Inches	Faced Each	Faced, Drilled and Spotfaced Each
2	\$21.00	\$25.00	9	\$100.00	\$110.00
2½	25.00	29.00	10	115.00	127.00
3	27.00	33.00	12	145.00	160.00
3½	32.00	38.00	14	190.00	205.00
4	36.00	42.00	15	210.00	225.00
4½	42.00	48.00	16	245.00	265.00
5	45.00	51.00	18	320.00	340.00
6	55.00	63.00	20	400.00	430.00
7	68.00	78.00	22	510.00	550.00
8	81.00	91.00	24	635.00	675.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

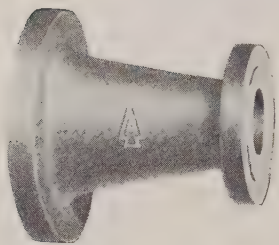
Extra for bolting on companion flanges, and wooden protectors, see page 223.

For drilling template, see page 461.

For dimensions, see pages 441 and 442.

For description, see page 22.

EXTRA HEAVY CAST STEEL REDUCERS
350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Flanged Taper Reducers
Fig. 4099



Flanged Eccentric Taper Reducers
Fig. 4100

For dimensions see pages 174 and 444.

PRICES ON APPLICATION
WROUGHT STEEL REDUCERS



Fig. 196

PRICE LIST

Labor only, pipe is not included

Size inches	4x2	4x3	5x3	6x3	6x4	6x5	8x4	8x5	8x6	10x6
Each.	\$60.00	\$55.00	\$65.00	\$80.00	\$75.00	\$70.00	\$90.00	\$85.00	\$80.00	\$120.00
Size inches	10x8	12x10	14x10	16x10	14x12	16x12	18x12	16x14	18x14	20x14
Each	\$100.00	\$110.00	\$130.00	\$160.00	\$120.00	\$150.00	\$190.00	\$140.00	\$175.00	\$220.00
Size inches	18x16	20x16	22x16	20x18	22x18	24x18	22x20	24x20	24x22	
Each	\$160.00	\$205.00	\$260.00	\$190.00	\$240.00	\$300.00	\$220.00	\$280.00	\$260.00	

By our swedging process, we obviate the use of cast reducers or reducing fittings, again cutting down the number of line joints. We are prepared to swedge pipe of any size up to and including 30 inches.

These reducers are swedged from the larger size—not expanded from the smaller one—thus maintaining the original thickness of the pipe.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

EXTRA HEAVY SPECIAL CAST STEEL FLANGED FITTINGS

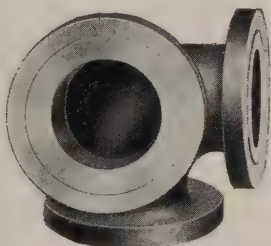
**350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE**



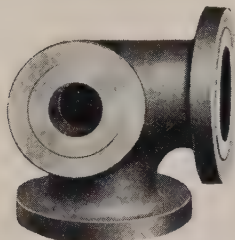
**Flanged Double Branch Elbow
Fig. 4101**



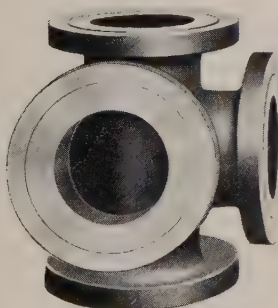
**Flanged Reducing Double
Branch Elbow
Fig. 4102**



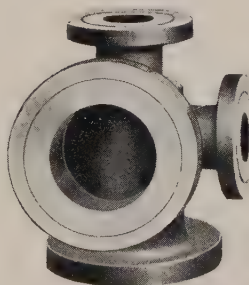
**Flanged Side Outlet Elbow
Fig. 4103**



**Flanged Reducing Side
Outlet Elbow
Fig. 4104**



**Flanged Four-way Tee
Fig. 4105**



**Flanged Reducing
Four-way Tee
Fig. 4106**

**THE ABOVE FITTINGS IN SIZES 2 to 24 INCHES MADE TO ORDER ONLY
PRICES ON APPLICATION**

Reducing Side Outlet Elbows are made reducing on the side outlet only. Double Branch Elbows are made reducing only on the run.

When ordering or requesting prices, send sketch showing sizes of all openings.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

EXTRA HEAVY CAST STEEL BLIND FLANGES

PRICE LIST

Size of Valve or Fitting and O. D. of Flange Inches	Faced Each	Faced, Drilled and Spotfaced Each
2 x 6½	\$8.40	\$10.00
2½ x 7½	8.80	11.00
3 x 8¼	10.70	14.00
3½ x 9	14.60	18.00
4 x 10	18.30	22.00
4½ x 10½	19.80	23.50
5 x 11	20.80	24.50
6 x 12½	24.90	29.50
7 x 14	30.70	36.50
8 x 15	34.00	40.00
9 x 16¼	37.00	43.00
10 x 17½	52.00	59.00
12 x 20½	70.00	78.00
14 x 23	85.00	95.00
15 x 24½	94.00	105.00
16 x 25½	115.00	127.00
18 x 28	145.00	158.00
20 x 30½	175.00	189.00
22 x 33	210.00	227.00
24 x 36	250.00	267.00

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

Extra for bolting on companion flanges and wooden protectors, see page 187.

For drilling template, see page 461.

For description, see page 22.

SPECIAL FACINGS, PROTECTORS, ETC.

FOR EXTRA HEAVY CAST STEEL FLANGED
FITTINGS AND VALVES

EXTRA NET PRICE LIST

Size Inches	Bolting on Companion Flanges Not Including Bolts or Gaskets For Labor Only			Furnishing and Bolting on Wooden Protectors Including Two Bolts		
	Extra for Fitting or Valve with Two Flanges Each	Extra for Fitting or Valve with Three Flanges Each	Extra for Fitting with Four Flanges Each	Extra for Fitting or Valve with Two Flanges Each	Extra for Fitting or Valve with Three Flanges Each	Extra for Fitting with Four Flanges Each
1¼ & 1½	\$0.20	\$0.30	\$0.40	\$0.40	\$0.60	\$0.80
2	.20	.30	.40	.40	.60	.80
2½	.20	.30	.40	.40	.60	.80
3 to 5	.30	.45	.60	.50	.75	1.00
6	.40	.60	.80	.50	.75	1.00
7	.40	.60	.80	.60	.90	1.20
8 & 9	.40	.60	.80	.60	.90	1.20
10	.40	.60	.80	.70	1.05	1.40
12	.50	.75	1.00	.70	1.05	1.40
14 & 15	.50	.75	1.00	.80	1.20	1.60
16	.50	.75	1.00	.90	1.35	1.80
18	.50	.75	1.00	.90	1.35	1.80
20	.50	.75	1.00	1.00	1.50	2.00
22	.50	.75	1.00	1.00	1.50	2.00
24	.50	.75	1.00	1.00	1.50	2.00

Unless otherwise specified, Cast Steel Flanged Fittings, when ordered faced and drilled, will always be furnished with spotfaced bolt holes.

The above net prices apply to both straight and reducing sizes.

Dimensions of male and female, see page 448.

FORGED STEEL VALVES AND FITTINGS

Forged Steel Valves and Fittings assure efficient and enduring service. They fulfil the most exacting requirements of high pressures and temperatures of oil, gas, ammonia, air, water, saturated and superheated steam.

LEAK PROOF—FLAW PROOF

These fittings are absolutely guaranteed not to leak when properly installed. They are positive proof against shrinkage cracks, blow or air holes and other defects.

BREAK PROOF

They are bored from solid forgings and are tapped accurately to gauge. The metal has an average tensile strength of 60,000 pounds, and being homogeneous, makes a completed fitting that cannot break or crack when tightened up.

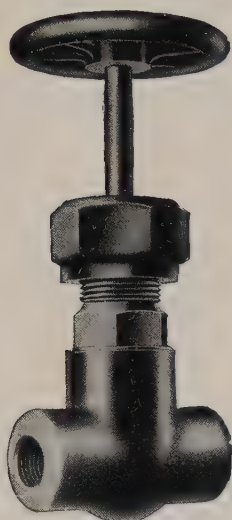
Cracking or breaking is practically impossible because, being forged, they are of greater strength than the pipe which is screwed into them.

For extreme pressures blanks are tapped for smaller sizes, thus increasing the thickness of the wall.

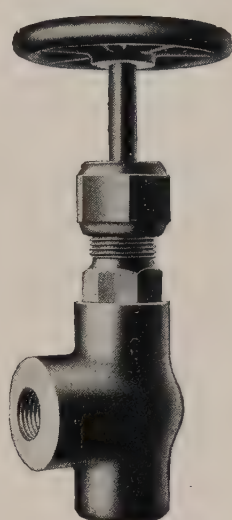
On pages 225 to 233 are illustrated Valves, Fittings and Flanges. When ordering give number which is printed in heavy type.

DROP FORGED STEEL GLOBE AND ANGLE VALVES

SCREW
ENDS



Globe Valve
Fig. 4183



Angle Valve
Fig. 4184

PRICE LIST—GLOBE VALVES

For Working Pressures up to 3000 Pounds					For Working Pressures 3001 to 5000 Pounds			
Size Inches	Number	Length End to End Inches	Weight Pounds	Price	Number	Length End to End Inches	Weight Pounds	Price
$\frac{1}{4}$	192	3	$2\frac{1}{2}$	\$ 7.50	1500	3	$2\frac{1}{2}$	\$ 7.50
$\frac{3}{8}$	193	3	$2\frac{1}{4}$	7.50	1501	$3\frac{1}{4}$	4	8.50
$\frac{1}{2}$	194	$3\frac{1}{4}$	$3\frac{3}{4}$	8.50	1502	$4\frac{3}{8}$	$8\frac{1}{2}$	9.50
$\frac{3}{4}$	195	$4\frac{3}{8}$	8	9.50	1503	$4\frac{3}{4}$	$12\frac{1}{4}$	10.50
1	196	$4\frac{3}{4}$	$11\frac{1}{4}$	10.50	1504	$5\frac{3}{4}$	$18\frac{1}{2}$	13.00
$1\frac{1}{4}$	197	$5\frac{3}{4}$	16	13.00	1505	$5\frac{3}{4}$	22	20.00
$1\frac{1}{2}$	198	$5\frac{3}{4}$	18	20.00	1506	$5\frac{3}{4}$	.....	30.00
2	199	$8\frac{1}{4}$	37	30.00	....	...	.....	.....

PRICE LIST—ANGLE VALVES

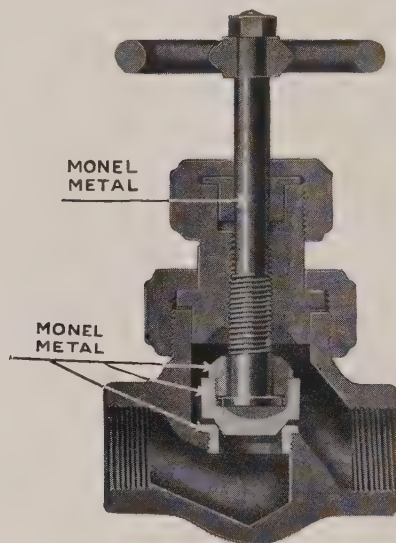
For Working Pressures up to 3000 Pounds					For Working Pressures 3001 to 5000 Pounds			
Size Inches	Number	Length Center to End Inches	Weight Pounds	Price	Number	Length Center to End Inches	Weight Pounds	Price
$\frac{1}{4}$	203	$1\frac{1}{2}$	$2\frac{1}{2}$	\$ 7.50	1600	$1\frac{1}{2}$	$2\frac{1}{4}$	\$ 7.50
$\frac{3}{8}$	204	$1\frac{1}{2}$	$2\frac{1}{4}$	7.50	1601	$1\frac{5}{8}$	$3\frac{1}{2}$	8.50
$\frac{1}{2}$	205	$1\frac{5}{8}$	$3\frac{1}{2}$	8.50	1602	$2\frac{3}{8}$	$7\frac{3}{4}$	9.50
$\frac{3}{4}$	206	$2\frac{3}{8}$	$7\frac{3}{4}$	9.50	1603	$2\frac{3}{8}$	11	10.50
1	207	$2\frac{3}{8}$	11	10.50	1604	$2\frac{5}{8}$	$14\frac{1}{2}$	13.00
$1\frac{1}{4}$	208	$2\frac{5}{8}$	$14\frac{1}{2}$	13.00	1605	$2\frac{5}{8}$	16	15.00
$1\frac{1}{2}$	209	$2\frac{5}{8}$	14	15.00	1606	3	....	25.00
2	210	3	28	25.00	....	...	.....	.....

The above valves are steel throughout, with steel body, disc and stem.
For description see page 224.

DROP FORGED STEEL GLOBE VALVES WITH MONEL METAL TRIMMINGS

SCREW ENDS

FOR WORKING PRESSURES UP TO 800 POUNDS, INCLUSIVE



**Globe Valve
Fig. 4185**

PRICE LIST

Size Inches	Number	Length End to End Inches	Weight Pounds	Price
$\frac{1}{4}$	3041	3	4	\$ 13.35
$\frac{3}{8}$	3042	3	4	13.35
$\frac{1}{2}$	3043	$3\frac{1}{4}$	$3\frac{3}{4}$	13.35
$\frac{3}{4}$	3044	$4\frac{3}{8}$	$5\frac{3}{4}$	15.00
1	3045	$4\frac{3}{8}$	10	17.50
$1\frac{1}{4}$	3046	$5\frac{3}{4}$	$16\frac{1}{2}$	25.00
$1\frac{1}{2}$	3047	$5\frac{3}{4}$	21	33.35
2	3048	$8\frac{1}{4}$	....	45.00

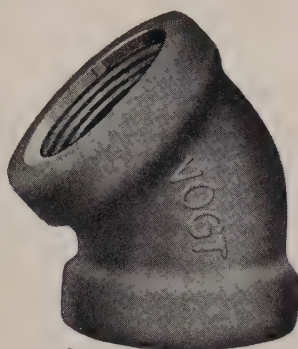
These valves are designed for High Pressures and Temperatures of Oil and Steam. The Stem, Disc and Seat are made of Monel Metal and are so arranged that they can be easily removed for regrinding.

DROP FORGED STEEL ELLS

SCREW ENDS



90° Elbow
Fig. 4186



45° Elbow
Fig. 4187

PRICE LISTS—90° ELLS

For Working Pressures up to 3,000 Pounds					For Working Pressures 3,001 to 10,000 Pounds			
Size Inches	Number	Center to Face Inches	Weight Pounds	Price	Number	Center to Face Inches	Weight Pounds	Price
1/4	230	1 1/8	1 1/2	\$ 0.55	1300	1 1/8	1 1/2	\$ 0.55
3/8	231	1 1/8	1 1/2	.55	1301	1 1/4	3/4	.65
1/2	232	1 1/4	5/8	.65	1302	1 1/2	1 1/4	.75
3/4	233	1 1/2	1	.75	1303	1 3/4	1 3/4	.90
1	234	1 3/4	1 1/4	.90	1304	2	2 3/4	1.20
1 1/4	235	2	2	1.20	1305	2 1/4	3 1/4	1.50
1 1/2	236	2 1/4	2 1/2	1.50	1306	2 1/2	6 1/4	1.90
2	237	2 1/2	4	1.90	1307	2 3/4	10 1/2	2.90
2 1/2	238	2 3/4	7 1/4	2.90	1308	3 1/4	14	5.00
3	239	3 1/4	11	5.00	1309	3 7/8	25	12.50
3 1/2	240	3 7/8	20	12.50	*	3 7/8	....	12.50
4	241	3 7/8	20	12.50	....	...	....	....

*This Ell good for pressures from 3,001 to 5,000 pounds.

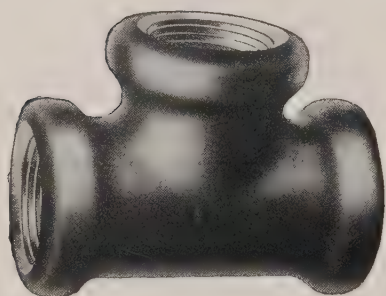
PRICE LISTS—45° ELLS

For Working Pressures up to 3,000 Pounds					For Working Pressures 3,001 to 10,000 Pounds			
Size Inches	Number	Center to Face Inches	Weight Pounds	Price	Number	Center to Face Inches	Weight Pounds	Price
1/4	2001	1 3/16	1 1/2	\$0.68	3031	1 3/16	1 1/2	\$0.68
3/8	2002	1 3/16	1 1/2	.68	3032	7/8	3/4	.78
1/2	2003	7/8	1 1/2	.78	3033	1	1	.90
3/4	2004	1	3/4	.90	3034	1 3/16	1 3/4	1.08
1	2005	1 3/16	1	1.08	3035	1 1/2	2 1/2	1.44
1 1/4	2006	1 1/2	1 1/2	1.44	3036	1 1/16	3 1/4	1.80
1 1/2	2007	1 7/16	2	1.80	3037	1 3/8	5	2.28
2	2008	1 3/4	3	2.28	3038	2 1/16	8	3.48
2 1/2	2009	2 1/16	5 1/2	3.48	....	...	....	....

Reducing Fittings 15 per cent extra.
For description, see page 224.

DROP FORGED STEEL TEES AND CROSSES

SCREW ENDS



Tee
Fig. 4188



Cross
Fig. 4189

PRICE LISTS—TEES

For Working Pressures up to 3,000 Pounds					For Working Pressures 3,001 to 10,000 Pounds			
Size Inches	Number	Center to Face Inches	Weight Pounds	Price	Number	Center to Face Inches	Weight Pounds	Price
1/4	244	1 1/8	3/4	\$ 0.80	1400	1 1/8	5/8	\$ 0.80
3/8	245	1 1/8	1 1/2	.80	1401	1 1/4	1	.95
1/2	246	1 1/4	3/4	.95	1402	1 1/2	1 1/2	1.10
3/4	247	1 1/2	1 1/4	1.10	1403	1 3/4	2 1/4	1.35
1	248	1 3/4	1 3/4	1.35	1404	2	3 3/4	1.75
1 1/4	249	2	2 1/4	1.75	1405	2 1/4	4 1/2	2.30
1 1/2	250	2 1/4	3 5/8	2.30	1406	2 1/2	9	2.90
2	251	2 1/2	5 3/4	2.90	1407	2 3/4	14	4.40
2 1/2	252	2 3/4	9 1/2	4.40	1408	3 1/4	19	7.50
3	253	3 1/4	12	7.50	1409	3 7/8	25	17.00
3 1/2	254	3 7/8	..	17.00	*	3 7/8	..	17.00
4	255	3 7/8	24	17.00	....	...	..	....

*This Tee for pressures from 3,001 to 5,000 pounds.

PRICE LISTS—CROSSES

For Working Pressures up to 3,000 Pounds					For Working Pressures 3,001 to 10,000 Pounds			
Size Inches	Number	Center to Face Inches	Weight Pounds	Price	Number	Center to Face Inches	Weight Pounds	Price
1/4	1900	1 1/8	1	\$1.10	2200	1 1/8	1 1/4	\$ 1.10
3/8	1901	1 1/8	1	1.10	2201	1 1/4	1 1/2	1.30
1/2	1902	1 1/4	1	1.30	2202	1 1/2	2	1.50
3/4	1903	1 1/2	1 1/2	1.50	2203	1 3/4	3 1/4	1.90
1	1904	1 3/4	2	1.90	2204	2	5 1/2	2.80
1 1/4	1905	2	3	2.80	2205	2 1/4	9	3.50
1 1/2	1906	2 1/4	5	3.50	2206	2 1/2	10	5.00
2	1907	2 1/2	6	5.00	2207	2 3/4	15	7.30
2 1/2	1908	2 3/4	11	7.30	...	...	..	....

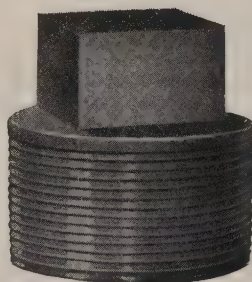
Reducing Fittings 15 per cent extra.
For description, see page 224.

DROP FORGED STEEL FITTINGS

SCREW ENDS



Street Ell
Fig. 4190



Steel Plug
Fig. 4191

PRICE LIST—STREET ELLS

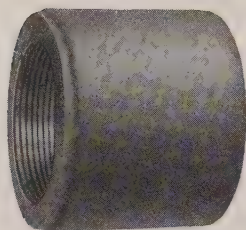
Size Inches	Number	Center to Face Inches	Weight Pounds	Price
$\frac{1}{4}$	1801	$\frac{7}{8}$ — $1\frac{1}{4}$	$\frac{1}{4}$	\$0.75
$\frac{3}{8}$	1802	$1\frac{1}{8}$ — $1\frac{5}{8}$	$\frac{1}{2}$	.85
$\frac{1}{2}$	1803	$1\frac{1}{8}$ — $1\frac{5}{8}$	$\frac{1}{2}$	.85
$\frac{3}{4}$	1804	$1\frac{3}{8}$ — $1\frac{7}{8}$	$\frac{3}{4}$	1.05
1	1805	$1\frac{3}{4}$ — $2\frac{1}{4}$	$1\frac{1}{4}$	1.40

PRICE LIST—STEEL PLUG

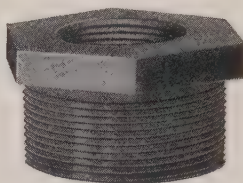
Size . . . inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Number . . .	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450
Price . . each	\$0.25	\$0.25	\$0.25	\$0.30	\$0.35	\$0.50	\$0.75	\$1.50	\$3.00	\$5.00

For description, see page 224.

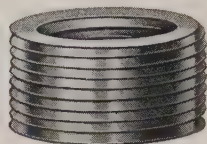
DROP FORGED STEEL COUPLINGS AND BUSHINGS SCREW ENDS



Steel Couplings
Fig. 4192



Steel Hexagon Bushings
Fig. 4193



Steel Flush Bushings
Fig. 4194

PRICE LIST—COUPLINGS

For Working Pressures up to 3,000 Pounds

Size.....inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Number.....	2431	2432	2433	2434	2435	2436	2437	2438	2439
Price.....each	\$0.40	\$0.40	\$0.40	\$0.45	\$0.55	\$0.70	\$0.85	\$1.15	\$1.60

For Working Pressures 3,001 to 5,000 Pounds

Size.....inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Number.....	3091	3092	3093	3094	3095	3096	3097	3098	3099
Price.....each	\$0.60	\$0.60	\$0.60	\$0.65	\$0.85	\$1.05	\$1.30	\$1.75	\$2.40

PRICE LIST—REDUCING COUPLINGS

For Working Pressures up to 3,000 Pounds

Size.....inches	$\frac{3}{8} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{4} \times \frac{1}{2}$	$1 \times \frac{3}{4}$	$1\frac{1}{4} \times 1$	$1\frac{1}{2} \times 1\frac{1}{4}$	$2 \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2$	3×2
Number.....	2451	2452	2453	2454	2455	2456	2457	2458	.....
Price.....each	\$0.55	\$0.70	\$1.00	\$1.20	\$1.35	\$1.60	\$1.85	\$2.75	\$8.00

Prices on Reducing Couplings not listed above, sent on application.

PRICE LIST—HEXAGON BUSHINGS

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$2 \times \frac{3}{4}$ and less	2×1 and more
Number.....	2401	2402	2403	2404	2405	2406	2407
Price.....each	\$0.45	\$0.45	\$0.50	\$0.66	\$0.83	\$1.20	\$1.32
Size.....inches	$2\frac{1}{2} \times 1\frac{1}{4}$ and less	$2\frac{1}{2} \times 1\frac{1}{2}$ and more	$3 \times 1\frac{1}{2}$ and less	3×2 and more	$4 \times 1\frac{1}{2}$ and less	4×2 and more	6×3 and more
Number.....	2408	2409	2410	2411	2412	2413	2414
Price.....each	\$4.50	\$5.00	\$7.25	\$8.00	\$8.25	\$9.00	\$13.35

PRICE LIST—FLUSH BUSHINGS

Size.....inches	$\frac{3}{8} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{4} \times \frac{1}{2}$	$1 \times \frac{3}{4}$	$1\frac{1}{4} \times 1$	$1\frac{1}{2} \times 1\frac{1}{4}$
Number.....	2421	2422	2423	2424	2425	2426
Price.....each	\$0.50	\$0.50	\$0.55	\$0.60	\$0.75	\$0.95
Size.....inches	$2 \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2$	$3 \times 2\frac{1}{2}$	$4 \times 1\frac{1}{2}$	6×4	8×6
Number.....	2427	2428	2429	2430	2431	2432
Price.....each	\$1.50	\$2.00	\$3.00	\$6.00	\$8.00	\$12.00

Price on Bushings not listed above, sent on application.
For description, see page 224.

DROP FORGED STEEL FLANGES **FOR WORKING PRESSURES UP TO 6,000 POUNDS** **INCLUSIVE**

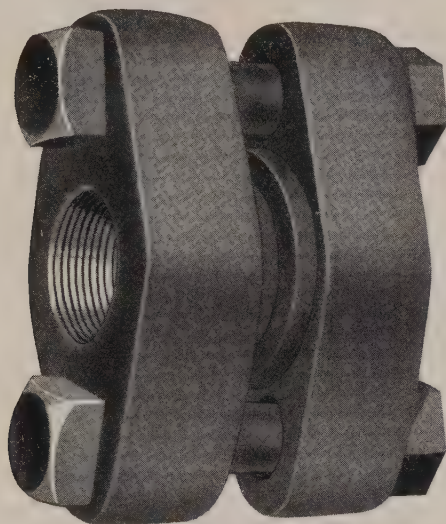


Fig. 4195

PRICE LIST

Size Inches	No.	Face to Face Inches	Length Inches	Width Inches	Bolts			Weight per Union Pounds	Price Single Flange	Price per Union
					No.	Diam. Inches	Length Inches			
1/2	3081	2 3/4	3 7/8	2	2	1/2	3 1/2	3 1/2	\$2.30	\$ 4.90
3/4	3082	2 3/4	4 1/4	2 1/4	2	5/8	3 3/4	4 3/4	2.40	5.00
1	3083	3	4 3/4	2 1/2	2	5/8	4	6	3.00	6.20
1 1/4	3084	3 1/4	5 1/4	2 3/4	2	3/4	4 1/2	8 1/2	3.80	7.80
1 1/2	3085	3 1/4	5 3/4	3 3/8	2	7/8	4 1/2	11	4.10	8.60
2	3086	3 3/4	6 3/4	4 1/2	2	1	5 1/2	20	5.20	11.00

On all orders for a "pair" of flanges or for a flange "union," one male and one female flange with necessary bolts and gasket will be furnished.

All orders for single flanges should state whether they are to be male or female.

Price per union includes two flanges, bolts and gasket.

For Hydraulic Service leather gaskets are furnished.

Reducing Flanges 15 per cent extra.

DROP FORGED STEEL FLANGES

FOR WORKING PRESSURES UP TO 5,000 POUNDS INCLUSIVE

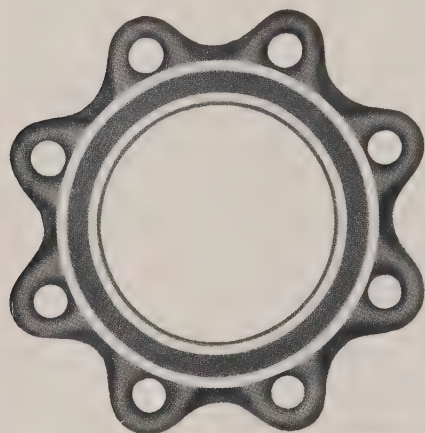


Fig. 4196

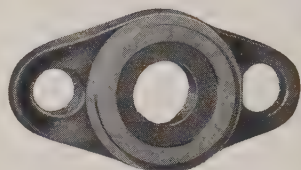


Fig. 4197

Type
Flanges
for
Pressures
up to
2,000 Pounds



Fig. 4198



Fig. 4199

Type Flanges
for
Pressures
from
2,500 Pounds
to
5,000 Pounds

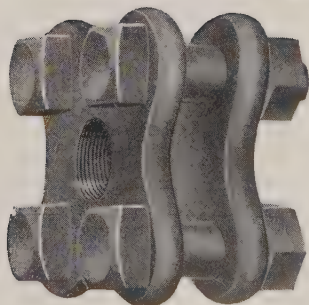


Fig. 4200

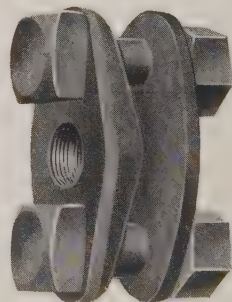


Fig. 4201

DROP FORGED STEEL FLANGES

FOR WORKING PRESSURES UP TO 5,000 POUNDS
INCLUSIVE

PRICE LIST

Size Inches	No.	Shape of Flanges	Bolts			Outside Size of Flanges Inches	Weight of Flange Union Pounds	Work- ing Pres- sure Pounds	Price Single Flange	Price per Union
			No.	Diam.	Length					
$\frac{1}{4}$	2099	Oval	2	$\frac{5}{8}$	$2\frac{1}{2}$	$3\frac{1}{2}$	3	3,500	\$ 0.45	\$ 1.00
$\frac{1}{4}$	2100	Oval	2	$\frac{7}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$6\frac{1}{4}$	5,000	1.70	3.80
$\frac{3}{8}$	2103	Oval	2	$\frac{5}{8}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	3,500	.45	1.00
$\frac{3}{8}$	2104	Oval	2	$\frac{7}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	6	5,000	1.70	3.80
$\frac{1}{2}$	2107	Oval	2	$\frac{5}{8}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{4}$	3,500	.55	1.20
$\frac{1}{2}$	2108	Oval	2	$\frac{7}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$5\frac{3}{4}$	5,000	1.70	3.80
$\frac{3}{4}$	2111	Oval	2	$\frac{3}{4}$	$2\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{4}$	2,500	.65	1.60
$\frac{3}{4}$	2113	Oval	2	$1\frac{1}{8}$	$3\frac{3}{4}$	$5\frac{15}{16}$	13	5,000	2.00	4.80
1	2116	Oval	2	$\frac{3}{4}$	$2\frac{3}{4}$	$4\frac{1}{2}$	4	2,500	.85	1.90
1	2118	Oval	2	$1\frac{1}{8}$	$3\frac{3}{4}$	$5\frac{15}{16}$	$12\frac{3}{4}$	5,000	2.40	5.60
$1\frac{1}{4}$	2121	Square	4	$\frac{3}{4}$	3	$5\frac{3}{8}$	$8\frac{1}{2}$	2,000	1.10	3.00
$1\frac{1}{4}$	2123	Square	4	$1\frac{1}{8}$	4	$6\frac{7}{8}$	$20\frac{3}{4}$	5,000	3.10	7.60
$1\frac{1}{2}$	2126	Square	4	$\frac{3}{4}$	3	$5\frac{3}{8}$	$8\frac{1}{4}$	2,000	1.35	3.50
$1\frac{1}{2}$	2128	Square	4	$1\frac{1}{8}$	4	$6\frac{7}{8}$	$20\frac{1}{2}$	5,000	3.50	8.40
2	2131	Square	4	$\frac{3}{4}$	$3\frac{1}{2}$	6	10	1,500	1.65	4.20
2	2133	Square	4	$1\frac{1}{4}$	$4\frac{1}{4}$	$7\frac{3}{16}$	$27\frac{1}{2}$	4,000	4.40	10.50
2	2134	Round	8	1	$4\frac{1}{2}$	$7\frac{3}{4}$	40	5,000	6.00	14.00
$2\frac{1}{2}$	2137	Square	4	$\frac{7}{8}$	$3\frac{1}{2}$	7	15	1,500	2.30	5.60
$2\frac{1}{2}$	2139	Square	4	$1\frac{3}{8}$	$4\frac{1}{2}$	$8\frac{3}{16}$	47	4,000	7.50	21.00
$2\frac{1}{2}$	2140	Round	8	$1\frac{1}{8}$	5	$8\frac{3}{4}$	55	5,000	10.00	24.00
3	2141	Square	4	$\frac{3}{4}$	$3\frac{1}{4}$	$7\frac{5}{8}$	13	500	2.75	6.00
$3\frac{1}{2}$	2142	Square	4	$\frac{3}{4}$	$3\frac{1}{4}$	$8\frac{3}{8}$	$16\frac{1}{2}$	500	3.70	8.00
4	2143	Round	8	$\frac{3}{4}$	$3\frac{1}{4}$	$9\frac{3}{8}$	$28\frac{1}{2}$	500	5.00	11.00
5	2144	Round	8	$\frac{3}{4}$	$3\frac{1}{4}$	$10\frac{1}{4}$	$30\frac{1}{2}$	500	6.50	14.00
6	2145	Round	12	$\frac{3}{4}$	$3\frac{1}{4}$	$11\frac{1}{2}$	40	500	9.25	20.00

On all orders for a "pair" of flanges or for a flange "union," one male and one female flange with necessary bolts and gasket will be furnished.

All orders for single flanges should state whether they are to be male or female.

Price per union includes two flanges, bolts and gasket.

In ordering, specify number printed in heavy type.

Reducing flanges 15 per cent extra.

For Hydraulic Service, leather gaskets are furnished.

HYDRAULIC MATERIAL

Hydraulic pressures at this time are not unusual at 2,000 or 3,000 pounds per square inch. The increase in weight and speeds of machines actuated, make a high pressure installation necessary in many cases. This is an economy provided the piping installation has the necessary strength to stand up under the strain. If it has not, endless trouble and expense are sure to result. Shock is much more severe and special precautions should be taken to provide for it.

We have adopted the Hydraulic American Standard as recommended by the American Society of Mechanical Engineers (see pages 235 to 238).

We still maintain, however, patterns for and stocks of materials in accordance with our previous standards, known as the Pittsburgh Standards for 1,000 pounds and 3,000 pounds Hydraulic Pressure.

The valves and fittings illustrated in the following pages have operated successfully under very trying conditions.

All metals used in the castings are of special mix, and great attention is given to the production of close-grained, tough metal.

We have lines of patterns for gate valves of this class which cannot be excelled. In these patterns we have eliminated flat surfaces, working under pressure wherever possible, and all surfaces are either cylindrical or special segments. All valves are tested to a pressure as high as consistent with good practice.

Flanges and pipe for the American Standard are threaded with Briggs Standard Pipe Thread, see pages 473, 493 and 500. For the Pittsburgh Standard the flanges and pipe are threaded with the taper running the full length of the thread (see pages 490 and 505).

We are prepared to furnish specially designed valves and fittings for any pressure or for any special service. Correspondence is solicited and prices will be quoted promptly.

HYDRAULIC STANDARDS

We have adopted the Hydraulic American Standards as recommended by the American Society of Mechanical Engineers. We also maintain our previous standard now known as the Pittsburgh Standard. These standards are shown in the table on page 235.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

TABLE OF HYDRAULIC STANDARDS

	Working Pressures— Pounds per Square Inch		
	No Shock	With Shock	Air or Gas
800 lb. American Standard.....	800	500	800
1,200 lb. American Standard.....	1,200	800	1,200
3,000 lb. American Standard.....	3,000	2,000	3,000
1,000 lb. Pittsburgh Standard.....	.....	1,000	.....
3,000 lb. Pittsburgh Standard.....	.....	3,000	.....

*Temperature not to exceed 100° F.

All orders should specify the type of material desired, whether American Standard or Pittsburgh Standard.

THE HYDRAULIC AMERICAN STANDARD FOR PIPE FLANGES, FITTINGS AND THEIR BOLTING

800 POUND HYDRAULIC AMERICAN STANDARD

800 Pounds Hydraulic American Standard Flanges and Flanged Fittings, 12 inches and smaller, for Full Weight Wrought Pipe, Semi-Steel and Cast Steel.

800 Pounds Cold Water Working Pressure—Hydrostatic (no shock).

500 Pounds Cold Water Working Pressure—Shock.

800 Pounds Air or Gas Working Pressure—Temperature not exceeding 100° Fahrenheit.

These fittings are recommended for pump columns, oil-transmission lines, gas lines and other hydraulic service where shock is negligible for a maximum working pressure of 800 lbs. and a maximum temperature of 100 deg. Fahr. Where subject to shock they are recommended for a maximum working pressure of 500 lbs.

The diameter of port is nominal size.

Reducing fittings carry same dimensions center to face as straight size fittings, corresponding to largest opening.

Flanges may be attached to the pipe by any of the following methods: Screw flanges; lap flanges; shrunk, peened or riveted flanges; flanges welded to pipe.

Flanges on fittings and valves, also all companion flanges, except those for lap joint, will be furnished with $\frac{3}{16}$ inch raised face on sizes 6 inches and under. Sizes above 6 inches will be furnished with $\frac{1}{4}$ inch raised face, unless otherwise specified.

Bolt holes are $\frac{1}{8}$ inch larger in diameter than bolts. Bolt holes straddle center lines. Unless otherwise specified, bolt holes in cast-steel fittings should be spotfaced.

Square-head bolts with hexagonal nuts are recommended. Hexagonal nuts on sizes 8 inch and smaller can be conveniently pulled up with open-end wrenches with minimum-design heads. Hexagonal nuts on sizes 9 inch and larger can be conveniently pulled up with box wrenches.

When flanges are screwed, shrunk, peened or riveted on the pipe, it is recommended that the end of the pipe and flange be refaced.

Gaskets extending from the inside of the pipe to the inside edge of the bolts are recommended. The ultimate compressive strength of the gasket must be sufficient to prevent it being crushed when bolts are pulled up.

Where long-radius elbows are desired, the use of pipe bends is recommended.

1,200 POUND HYDRAULIC AMERICAN STANDARD

1,200 Pounds Hydraulic American Standard Flanges and Flanged Fittings, 12 inches and smaller. For extra strong Wrought Pipe, Semi-Steel and Cast Steel.

1,200 Pounds Cold Water Working Pressure—Hydrostatic (no shock).

800 Pounds Cold Water Working Pressure—Shock.

1,200 Pounds Air or Gas Working Pressure. Temperature not exceeding 100° Fahrenheit.

These fittings are recommended for pump columns, oil-transmission lines, gas line and other hydraulic service where shock is negligible for a maximum working pressure of 1,200 pounds and a maximum temperature of 100 deg. Fahr. Where subject to shock they are recommended for a maximum working pressure of 800 pounds.

The diameter of port is approximately the same as the inside diameter of Extra Strong Pipe.

Reducing fittings carry the same dimensions center to face as straight-size fittings corresponding to largest opening.

Flanges may be attached to the pipe by any of the following methods: Screw flanges; lap flanges; shrunk, peened or riveted flanges; flanges welded to pipe.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Flanges on fittings and valves, also all companion flanges, except those for lap joint, will be furnished with $\frac{3}{16}$ inch raised face on sizes 6 inches and under. Sizes above 6 inches will be furnished with $\frac{1}{4}$ inch raised face, unless otherwise specified.

Bolt holes are $\frac{1}{8}$ inch larger in diameter than bolts. Bolt holes straddle center lines. Unless otherwise specified, bolt holes in cast steel fittings should be spotfaced.

Square-head bolts with hexagonal nuts are recommended. Hexagonal nuts on sizes 8 inch and smaller can be conveniently pulled up with open-end wrenches with minimum-design heads. Hexagonal nuts on sizes 9 inch and larger can be conveniently pulled up with box wrenches.

When flanges are screwed, shrunk, peened or riveted on the pipe, it is recommended that the end of the pipe and flange be refaced.

Gaskets extending from the inside of the pipe to the inside edge of the bolts are recommended. The ultimate compressive strength of the gasket must be sufficient to prevent its being crushed when the bolts are pulled up.

Where long radius elbows are desired, the use of pipe bends is recommended.

3,000 POUND HYDRAULIC AMERICAN STANDARD

3,000 Pounds Hydraulic American Standard Flanges and Flanged Fittings, 12 inches and smaller. For Double Extra Strong Wrought Pipe, Cast Steel.

3,000 Pounds Cold Water Working Pressure—Hydrostatic (no shock).

2,000 Pounds Cold Water Working Pressure—Shock.

3,000 Pounds Air or Gas Working Pressure. Temperature not exceeding 100° Fahrenheit.

These fittings are recommended for hydraulic service where shock is negligible for a maximum working pressure of 3000 pounds and a maximum temperature of 100 deg. Fahr. Where subject to shock they are recommended for a maximum working pressure of 2,000 pounds.

The diameter of port is approximately the same as the inside diameter of Double Extra Strong Pipe

Reducing fittings carry same dimensions center to face as straight-size fittings corresponding to largest opening.

Flanges may be attached to the pipe by either of the following methods: Screw flanges; flanges welded to pipe.

Flanges on fittings and valves will be furnished with $\frac{3}{16}$ inch raised face on sizes 6 inches and under. Sizes above 6 inches will be furnished with $\frac{1}{4}$ inch raised face, unless otherwise specified.

Screw flanges are furnished with plain face and are threaded with American Briggs Standard lock-nut threads. The pipe should be threaded with American Briggs Stand-

ard lock-nut threads, and the end of the pipe should be faced off square. The pipe should be screwed through the flange until the end projects about $\frac{1}{4}$ inch beyond the face of the flange and bears against the gasket.

When flanges are welded on the pipe the end of the pipe should project through the flange and should be faced off square to form the raised face.

Bolt holes are $\frac{1}{8}$ inch larger in diameter than bolts. Bolt holes straddle center lines. Unless otherwise specified, bolt holes should be spotfaced.

Square-head bolts with hexagonal nuts are recommended. Hexagonal nuts on sizes 5 inch and smaller can be conveniently pulled up with open-end wrenches with minimum-design heads. Hexagonal nuts on sizes 6 inch and larger can be conveniently pulled up with box wrenches.

Gaskets extending from the inside of the pipe to the inside edge of the bolts are recommended. The ultimate compressive strength of the gasket must be sufficient to prevent its being crushed when the bolts are pulled up. Soft metallic gaskets at least $\frac{1}{16}$ inch thick are recommended.

Where long radius elbows are desired, the use of pipe bends is recommended.



ATWOOD

HYDRAULIC FLANGED CRITCHLOW VALVES

SEMI-STEEL BODY—BRONZE BUSHED

500 POUNDS WORKING PRESSURE—SHOCK

The Critchlow Valve is the simplest form of hydraulic three- or four-way piston valve. For working pressures up to 500 pounds it is equal to any valve made. It is easy of access to repack, as all of the packing leathers are carried on the stem, and to remove the stem it is necessary only to remove the top cap and withdraw the piston.

Omitting the lower branch converts the valve, which is four-way in the cut, into a three-way valve.

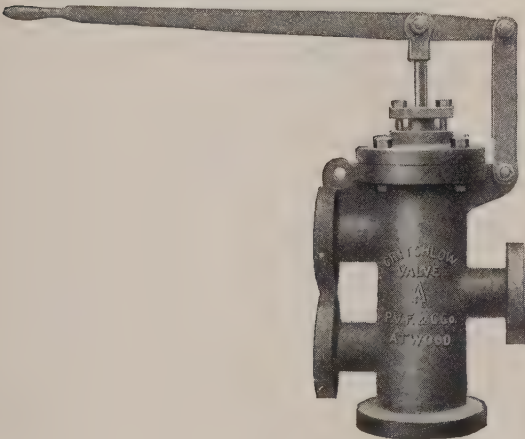


Fig. 521

PRICE LIST

Size.....inches	1	1¼	1½	2	2½	3	4
Three-way each	\$65.00	\$75.00	\$95.00	\$130.00	\$175.00	\$200.00	\$360.00
Four-way each	70.00	80.00	100.00	135.00	180.00	205.00	365.00

Following are a few illustrations of applications of these valves.
Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 282.
For drilling template, see page 462.
For dimensions, see page 462.
For drilling price list, see page 282.

**HYDRAULIC SCREWED CRITCHLOW
VALVES**

**SEMI-STEEL BODY—BRONZE BUSHED
500 POUNDS WORKING PRESSURE—SHOCK**

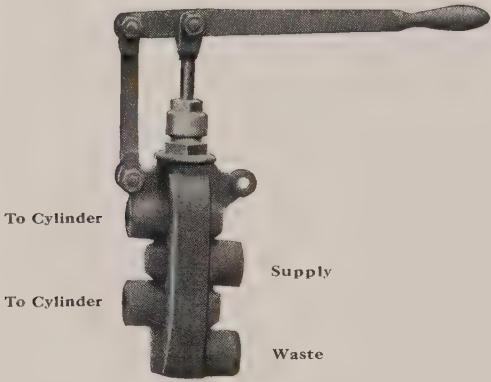


Fig. 520

**NOTE.—These valves are interchangeable with, and
supersede, the Bronze Valves**

PRICE LIST

Size	inches	$\frac{3}{4}$	1	$1\frac{1}{4}$
Each		\$40.00	\$50.00	\$60.00

These compact valves offer a very convenient means for controlling the motion of hydraulic cylinders, either single acting or double acting. They are simple, easily repaired, and durable.

Plugging one of the openings converts the valve, which is four-way in the cut, into a three-way valve.

For dimensions, see page 463.

SPECIAL HYDRAULIC CRITCHLOW VALVES

**FOR OPERATING CENTERING GEAR DEVICES ON
REVERSING ENGINES**

BRONZE BODY—BRONZE BUSHED

500 POUNDS WORKING PRESSURE—SHOCK

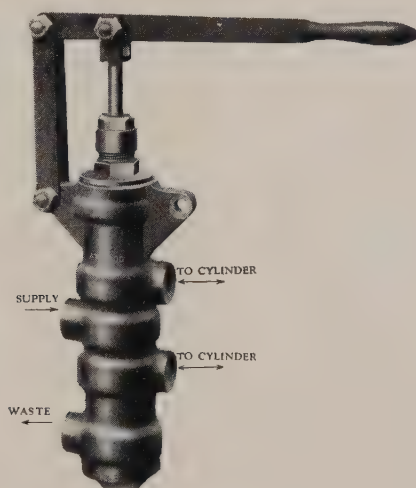


Fig. 5013

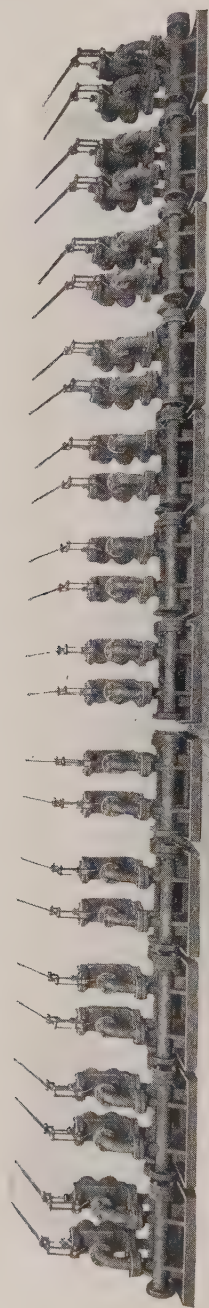
$\frac{1}{2}$ -Inch Critchlow Centering Valve

Prices on Application

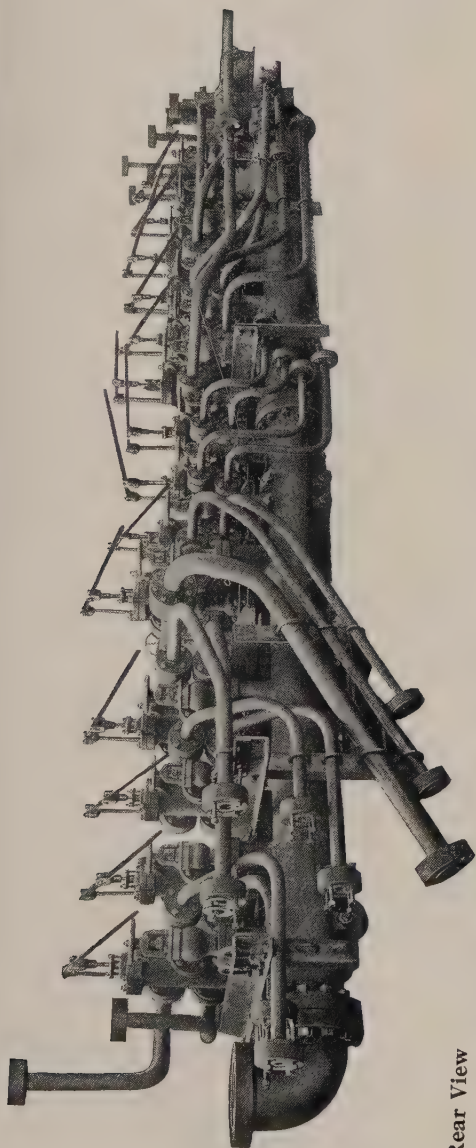
These valves are designed to supply pressure to both sides of a hydraulic piston when lever is in its central position and to exhaust one side or the other by a movement of the lever.

The ports in these valves are equivalent to the full area of $\frac{1}{2}$ -inch standard weight pipe (see page 338).

For Sectional View, see page 464.



Twelve Sets of Pressure and Waste Manifolds. Fitted with 1 1/4-inch
4-way Critchlow Valves for the Carnegie Steel Co., Donora Works

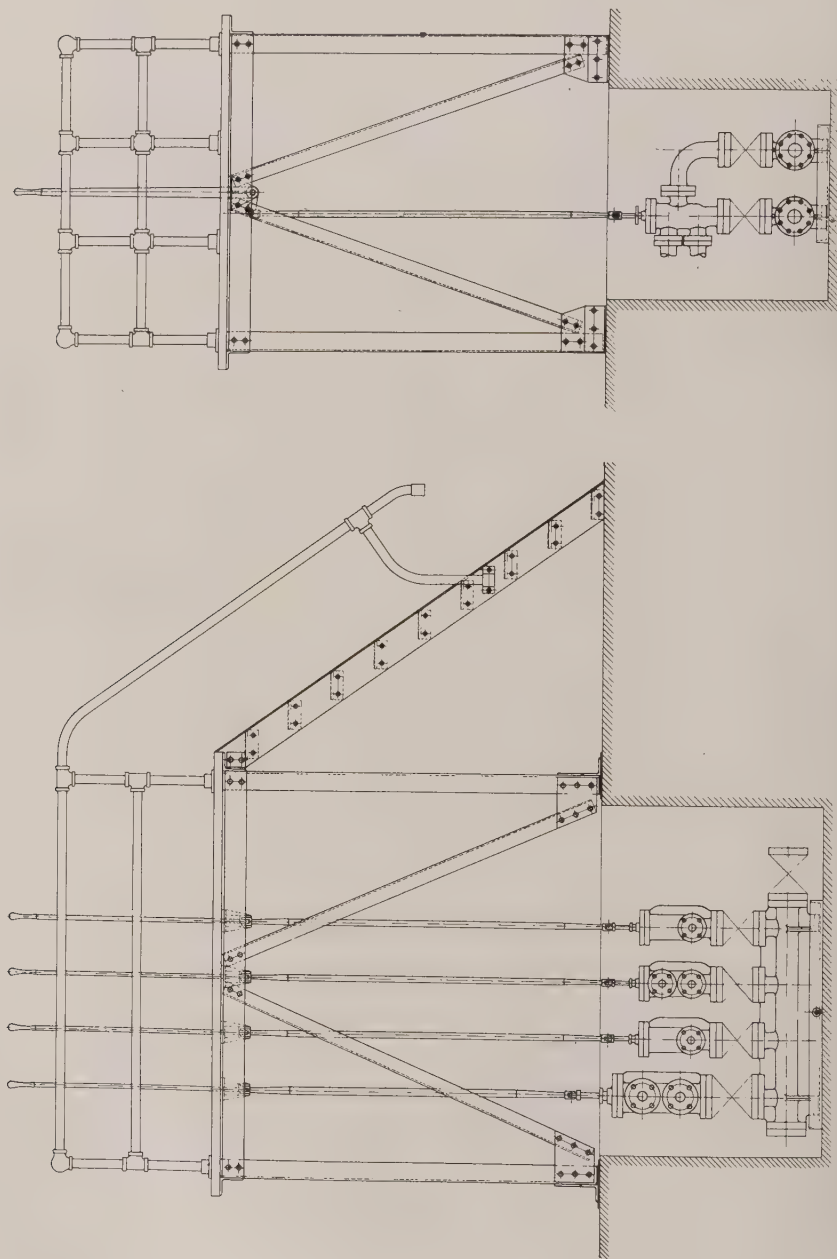


Rear View

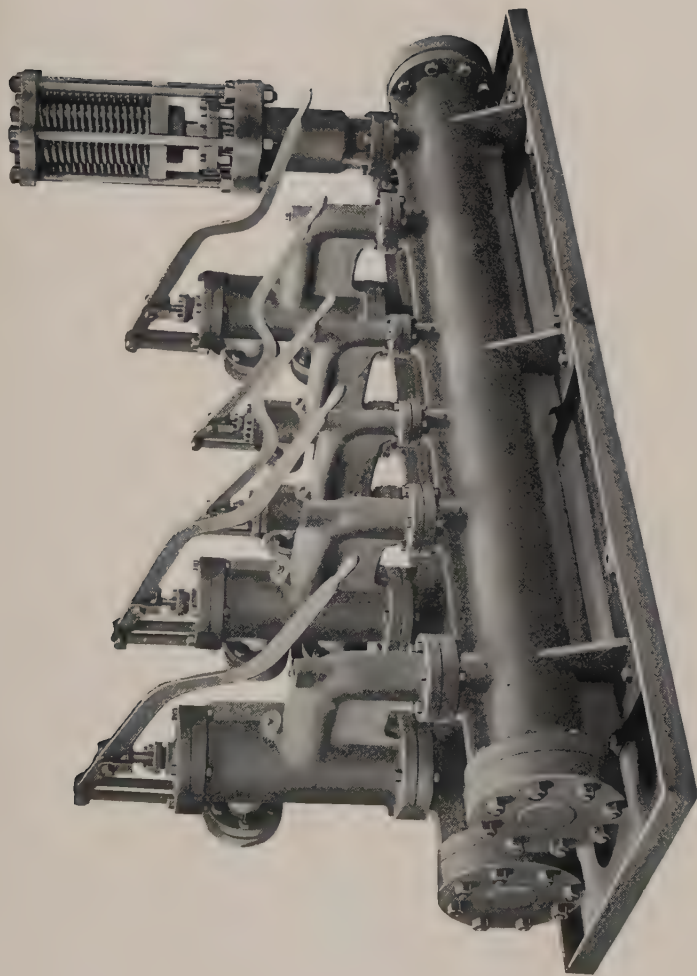


Front View

Hydraulic Manifold for Jones & Laughlin Steel Co., Bessemer Department
Fitted up Complete in Our Shop and Shipped as Shown



Crichtlow Vaves Operated from Pulpits



Hydraulic Manifold, with Critchlow Valves and Spring Cushion
Made for Donora Works, Carnegie Steel Co.

CRITCHLOW NESTS

The Critchlow Nest furnishes a means of grouping valves which yield a great saving in pipe, fittings, manifolds and space, where a number of similar small cylinders are to be operated from one pulpit; for instance, furnace doors, covers, etc.

Unlimited combinations can be obtained, as we make the nests with any number of valves up to six, and by use of the center stands shown, these groups can be extended indefinitely.

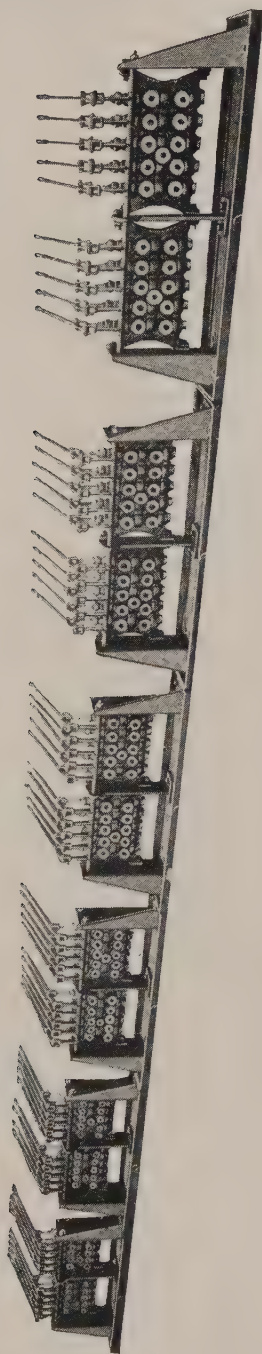
Dimensions and data to enable the designer to meet any requirements can be found on pages 466 to 468.

Prices will be quoted on application.

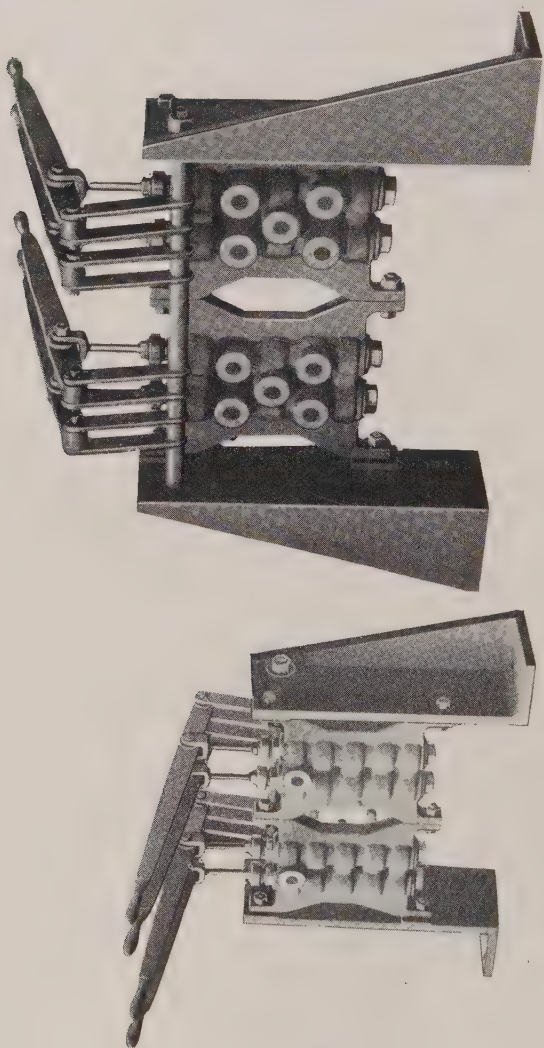
The outside casings of these valves are bronze and the bushing is separate therefrom and pressed in so that when it becomes cut, repairs can be made without sacrificing the whole nest.

The ports in these valves are equivalent to the full area of the nominal size of standard weight pipe (see page 338).

Unless otherwise specified these valves will be tapped for the nominal size of pipe, but can be tapped one size larger if so ordered.



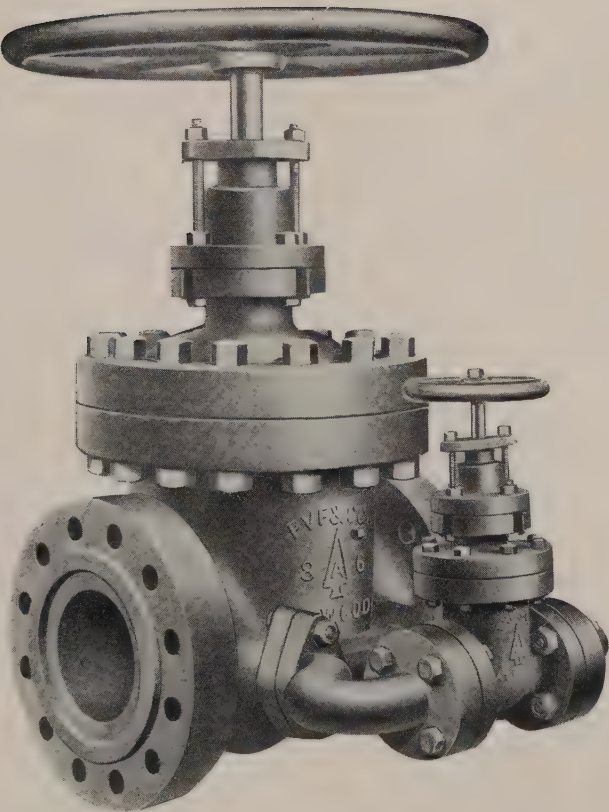
Six Groups of 1-inch 4-way 5-chamber Bronze Crichtlow Valve Nests,
Two Nests to a Group. For Carnegie Steel Co., Sharon Works



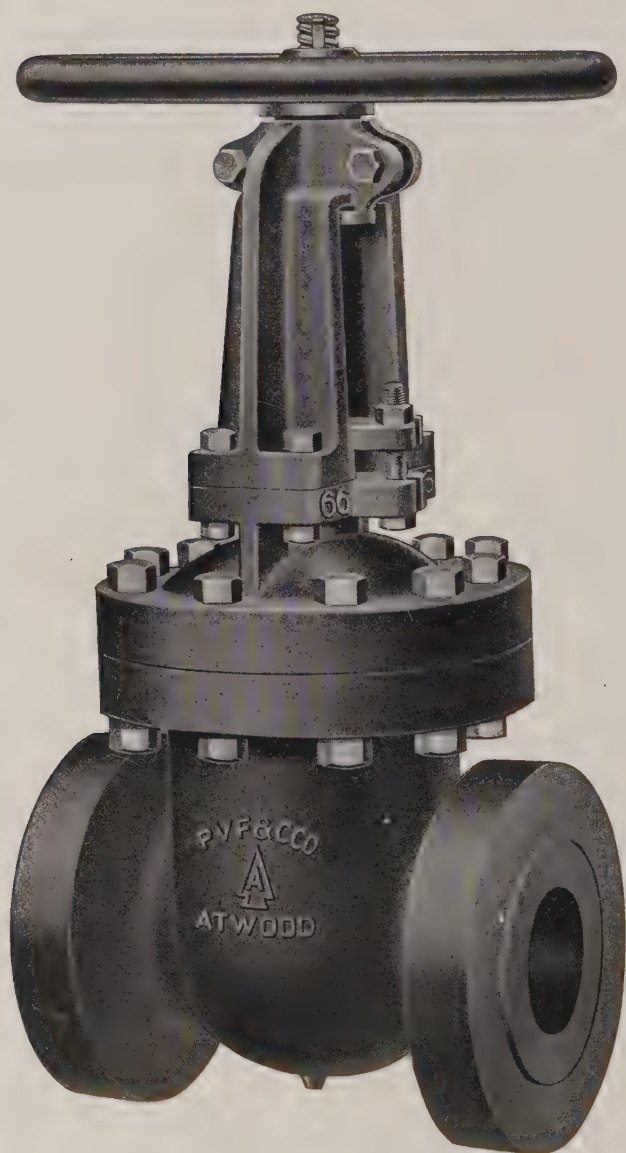
Front View

Rear View

Front and Rear Views of 1-inch 4-way 2-chamber Bronze Critchlow Valve
Nests. Two Nests to a Group



8-inch Hydraulic Taper Seat Gate Valve with By-pass



6-inch Hydraulic Taper Seat Gate Valve

HYDRAULIC GATE VALVES No. 5 P
800 POUNDS HYDRAULIC AMERICAN STANDARD
SEMI-STEEL

800 Pounds—Cold Water Working Pressure—Hydrostatic (no shock).

500 Pounds—Cold Water Working Pressure—Shock.

800 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding 100° Fahrenheit

We recommend this type of valve for water at 800 pounds working pressure. They have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them. Valves 3 inches and smaller, have bronze discs. Valves larger than 3 inches have semi-steel discs with bronze disc rings.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made with bronze, or special mountings.

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel, when both are forced outward against their respective seats. In the smaller sizes these wedges are solid bronze and in larger sizes cast iron bronze mounted. This bronze mounting is cast into the iron in such a way as to make it impossible for it to become detached. It is thus seen that the wedging mechanism, being non-corrosive, cannot interlock and fail to open.

When gearing is necessary our standard types of bevel and spur gears can be made to fit almost any condition (see pages 532 to 536). If special conditions exist these types can be varied to suit.

We are prepared to furnish any desired special operating mechanism, such as cylinders for air, water or steam, or motor drives (see pages 30 to 42).

Outside screw and yoke valves are backseated for repacking as shown in Figure 206, page 50.

Unless otherwise ordered, all valves are made to open by turning the wheel or nut to the left, viz., opposite the motion of the hands of a clock.

When so ordered standard valves will be equipped with by-passes. The by-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working pressure.

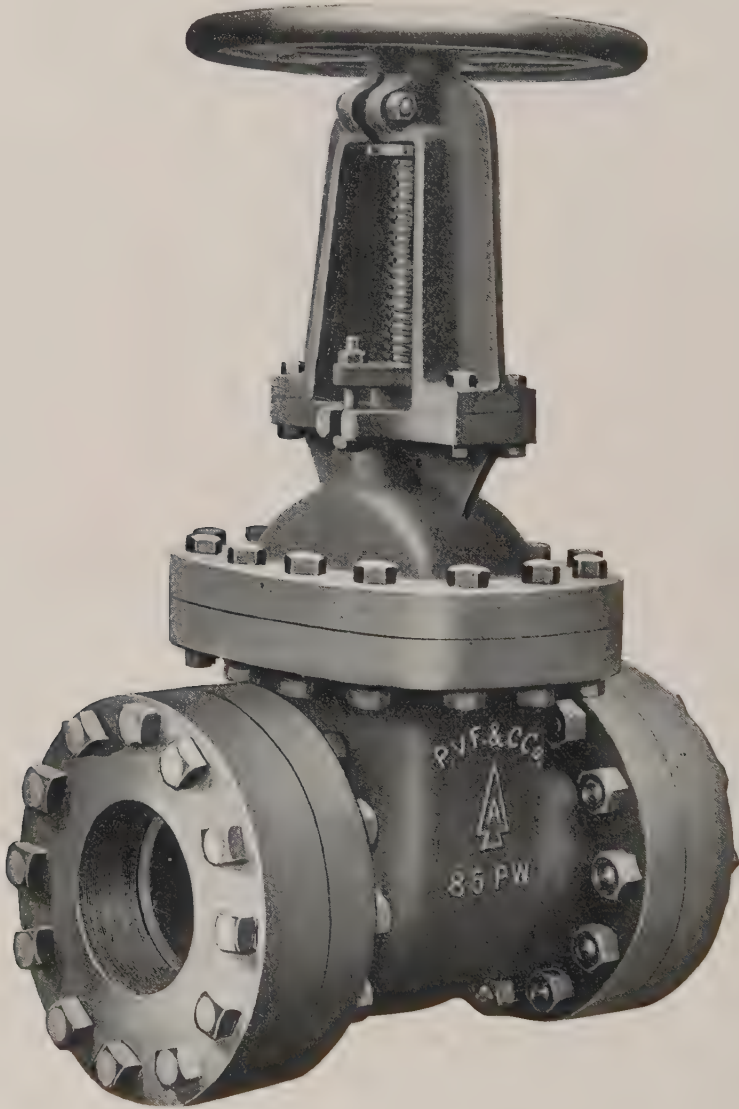
Whether screw ends, or flanged ends.

Whether inside screw or outside screw and yoke.

Whether gearing is required; if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.



8-inch Hydraulic Gate Valve, 800 Pounds Working Pressure

HYDRAULIC GATE VALVES No. 5 P

800 POUNDS HYDRAULIC AMERICAN STANDARD

SEMI-STEEL. BRONZE MOUNTED. PARALLEL SEAT

800 Pounds—Cold Water Working Pressure—Hydrostatic (no shock)

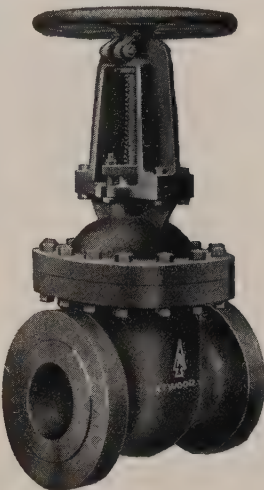
500 Pounds—Cold Water Working Pressure—Shock

800 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding 100 deg. Fahr.



Inside Screw
Fig. 5002

The minimum opening through these valves is 100 per cent of the pipe area.



Outside Screw and Yoke
Fig. 5003

The bore of these valves is made to suit nominal size of standard weight pipe. See page 338.

PRICE LIST

Size.....inches	2	2½	3	4	5
Inside Screw.....each	\$45.00	\$55.00	\$60.00	\$70.00	\$105.00
O. S. & Y.....each	50.00	63.00	71.00	85.00	125.00
Size.....inches	6	8	10	12	
Inside Screw.....each	\$115.00	\$200.00	\$370.00	\$450.00	.....
O. S. & Y.....each	140.00	230.00	420.00	530.00	.....

These valves are regularly furnished with a raised face but can be furnished with Male and Female or Tongue and Groove face, at an extra cost, if so ordered.

Bodies are of semi-steel; seats, disc mountings, wedges and disc nuts are bronze; stem is cast bronze for inside screw valves, and rolled bronze for Outside Screw and Yoke valves.

Valves 3 inches and smaller have bronze discs. Valves larger than 3 inches have semi-steel discs with bronze disc rings.

Valves are furnished with flanges undrilled unless otherwise ordered.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 473.

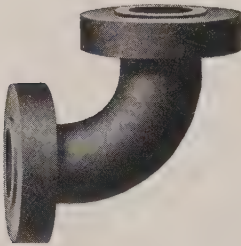
For dimensions, see page 469.

For description, see page 251.

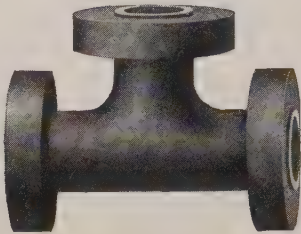
For drilling price list, see page 282.

HYDRAULIC FLANGED FITTINGS
SEMI-STEEL AND CAST STEEL

800 pounds—Cold Water Working Pressure—Hydrostatic (No Shock)
500 pounds—Cold Water Working Pressure—Shock
800 pounds—Air or Gas Working Pressure—Temperature Not Exceeding
100 Deg. Fahr.



Elbows
Fig. 5004



Tees
Fig. 5005

PRICE LIST

90° Elbows			Tees		
Size Inches	Semi-Steel	Cast Steel	Size Inches	Semi-Steel	Cast Steel
	Faced and Drilled Not Spotfaced Each	Faced, Drilled and Spotfaced Each		Faced and Drilled Not Spotfaced Each	Faced, Drilled and Spotfaced Each
1½	\$17.00		1½	\$22.50	
2	19.00	\$34.50	2	25.00	\$52.80
2½	20.50	40.50	2½	27.00	63.30
3	22.50	45.00	3	30.00	67.20
4	30.00	63.00	4	40.00	99.90
6	50.00	109.50	6	65.00	160.20
8	75.00	196.50	8	100.00	261.00
10	120.00	288.00	10	155.00	378.00
12	185.00	366.60	12	225.00	495.00

These fittings are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face, at an extra cost, if so ordered.

Tees are furnished female all around, and elbows with one face male and other face female when special facings are ordered.

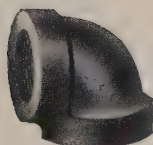
The bore of these fittings is made to suit nominal size of standard weight pipe. See page 338.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 473. For dimensions, see page 470.

HYDRAULIC SCREWED FITTINGS
SEMI-STEEL

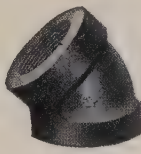
800 Pounds—Cold Water Working Pressure—Hydrostatic (no shock)
500 Pounds—Cold Water Working Pressure—Shock
800 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding
100 deg. Fahr.



90° Elbow
Fig. 531



Tee
Fig. 532



45° Elbow
Fig. 533

PRICE LIST

Elbows		Tees		45 Degree Elbows	
Size Inches	Each	Size Inches	Each	Size Inches	Each
1/2	\$0 .45	1/2	\$0 .70	1/2	\$.55
3/4	.60	3/4	.90	3/4	.75
1	.65	1	1 .10	1	.80
1 1/4	.90	1 1/4	1 .40	1 1/4	1 .10
1 1/2	1 .20	1 1/2	1 .80	1 1/2	1 .45
2	1 .30	2	2 .00	2	1 .55
2 1/2	2 .00	2 1/2	2 .90	2 1/2	2 .40
3	3 .20	3	4 .50	3	3 .85
4	5 .50	4	7 .75	4	6 .60

For dimensions, see page 471.

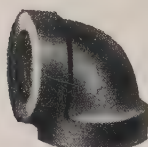
HYDRAULIC SCREWED FITTINGS

ROUGH BRONZE

800 Pounds—Cold Water Working Pressure—Hydrostatic (no shock)

500 Pounds—Cold Water Working Pressure—Shock

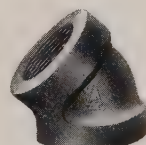
800 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding
100 deg. Fahr.



90° Elbow
Fig. 528



Tee
Fig. 529



45° Elbow
Fig. 530

PRICE LIST

Elbows		Tees		45 Degree Elbows	
Size Inches	Each	Size Inches	Each	Size Inches	Each
1/4	\$0.35	1/4	\$0.50	1/4	\$0.45
3/8	.45	3/8	.60	3/8	.55
1/2	.65	1/2	1.00	1/2	.85
3/4	.90	3/4	1.25	3/4	1.15
1	1.40	1	2.10	1	1.75
1 1/4	2.00	1 1/4	2.80	1 1/4	2.50
1 1/2	2.50	1 1/2	3.75	1 1/2	3.25
2	4.00	2	5.50	2	5.00
2 1/2	6.50	2 1/2	9.00	2 1/2	7.50
3	10.00	3	14.50	3	11.50
4	16.00	4	23.00	4	18.00

For dimensions, see page 472.

HYDRAULIC SCREWED FLANGES
SEMI-STEEL AND CAST STEEL

800 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)
500 Pounds—Cold Water Working Pressure—Shock
800 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding
100 Deg. Fahr.

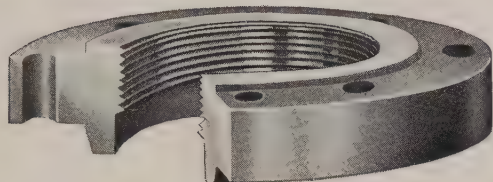


Fig. 5006

PRICE LIST

Size Inches	Semi-Steel	Cast Steel
	Faced and Drilled Each	Faced, Drilled and Spotfaced Each
1½	\$ 3.25	\$16.80
2	3.75	19.20
2½	4.75	22.00
3	5.00	24.30
4	6.75	30.60
6	15.00	48.00
8	20.00	65.40
10	30.00	88.50
12	40.00	108.60

These flanges are regularly furnished with raised face, but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.

If not ordered in pairs, state whether male or female or tongue or groove is wanted.

For reducing and blind flanges, add 50% to the above list.

Extra for wooden protectors, see page 282.

For drilling template, see page 473.

For dimensions, see page 473.

MACHINE BOLTS

HYDRAULIC AMERICAN STANDARD FOR 800 POUNDS

MANUFACTURERS' STANDARD BOLTS
SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 473

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Number of Bolts	Size of Bolts for One Joint			Price Each For One Joint
		Flange and Flange	Flange and Fitting	Fitting and Fitting	
$\frac{1}{2}$	4	$\frac{7}{16} \times 2\frac{1}{4}$	$\frac{7}{16} \times 2\frac{1}{4}$	$\frac{7}{16} \times 2\frac{1}{4}$	\$0.16
$\frac{3}{4}$	4	$\frac{1}{2} \times 2\frac{1}{4}$	$\frac{1}{2} \times 2\frac{1}{4}$	$\frac{1}{2} \times 2\frac{1}{4}$	.20
1	4	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	.20
$1\frac{1}{4}$	4	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	.22
$1\frac{1}{2}$	4	$\frac{5}{8} \times 2\frac{3}{4}$	$\frac{5}{8} \times 2\frac{3}{4}$	$\frac{5}{8} \times 2\frac{3}{4}$	.31
2	8	$\frac{5}{8} \times 3\frac{3}{4}$	$\frac{5}{8} \times 3\frac{3}{4}$	$\frac{5}{8} \times 3\frac{3}{4}$	.96
$2\frac{1}{2}$	8	$\frac{3}{4} \times 4$	$\frac{3}{4} \times 4$	$\frac{3}{4} \times 4$	1.02
3	8	$\frac{3}{4} \times 4\frac{1}{4}$	$\frac{3}{4} \times 4\frac{1}{4}$	$\frac{3}{4} \times 4\frac{1}{4}$	1.02
$3\frac{1}{2}$	8	$\frac{7}{8} \times 4\frac{3}{4}$	$\frac{7}{8} \times 4\frac{3}{4}$	$\frac{7}{8} \times 4\frac{3}{4}$	1.42
4	8	$\frac{7}{8} \times 5\frac{1}{4}$	$\frac{7}{8} \times 5\frac{1}{4}$	$\frac{7}{8} \times 5\frac{1}{4}$	1.48
$4\frac{1}{2}$	8	$\frac{7}{8} \times 5\frac{1}{2}$	$\frac{7}{8} \times 5\frac{1}{2}$	$\frac{7}{8} \times 5\frac{1}{2}$	1.48
5	8	1 x $5\frac{3}{4}$	1 x $5\frac{3}{4}$	1 x $5\frac{3}{4}$	2.14
6	12	1 x 6	1 x 6	1 x 6	3.33
7	12	1 x $6\frac{1}{2}$	1 x $6\frac{1}{2}$	1 x $6\frac{1}{2}$	3.33
8	12	$1\frac{1}{8} \times 7$	$1\frac{1}{8} \times 7$	$1\frac{1}{8} \times 7$	4.93
9	16	$1\frac{1}{8} \times 7\frac{1}{2}$	$1\frac{1}{8} \times 7\frac{1}{2}$	$1\frac{1}{8} \times 7\frac{1}{2}$	6.79
10	16	$1\frac{1}{4} \times 7\frac{3}{4}$	$1\frac{1}{4} \times 7\frac{3}{4}$	$1\frac{1}{4} \times 7\frac{3}{4}$	9.11
12	20	$1\frac{1}{4} \times 8$	$1\frac{1}{4} \times 8$	$1\frac{1}{4} \times 8$	11.38

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

800 POUNDS HYDRAULIC AMERICAN STANDARD

For Template, see page 473

PRICE LIST FOR ONE JOINT

Pipe Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$
Size of Ring Gasket...	$1\frac{15}{16} \times 1\frac{1}{2}$	$2\frac{3}{8} \times \frac{3}{4}$	$2\frac{3}{4} \times 1$	$3\frac{1}{4} \times 1\frac{1}{4}$	$3\frac{7}{8} \times 1\frac{1}{2}$	$4\frac{1}{2} \times 2$	$5\frac{1}{8} \times 2\frac{1}{2}$	$5\frac{3}{4} \times 3$	$6\frac{5}{8} \times 3\frac{1}{2}$
Price.....each	\$0.15	\$0.15	\$0.15	\$0.15	\$0.20	\$0.30	\$0.35	\$0.40	\$0.50

Pipe Size.....inches	4	$4\frac{1}{2}$	5	6	7	8	9	10	12
Size of Ring Gasket...	$7\frac{5}{8} \times 4$	$8\frac{3}{8} \times 4\frac{1}{2}$	$9\frac{1}{2} \times 5$	$10\frac{1}{2} \times 6$	$11\frac{1}{2} \times 7$	$12\frac{5}{8} \times 8$	$14\frac{3}{8} \times 9$	$15\frac{3}{4} \times 10$	18×12
Price.....each	\$0.70	\$0.80	\$1.05	\$1.20	\$1.35	\$1.50	\$2.00	\$2.35	\$2.90

“Ring” gaskets cover the face of flange from inside of bolt to inside of pipe.

HYDRAULIC GATE VALVES No. 6 T

1000 POUNDS PITTSBURGH STANDARD

SEMI-STEEL

1000 POUNDS WORKING PRESSURE—SHOCK

Although we have adopted the Hydraulic American Standards, we are in a position to furnish material for our previous 1000-pound Hydraulic line, now known as the 1000 Pounds Pittsburgh Standard. There has been no change in this line as to drilling or dimensions.

For this service we recommend our hydraulic taper seat pattern fully bronze mounted. Wherever possible all surfaces under pressure are either cylindrical or spherical segments.

The bodies and bonnets are made of semi-steel having a tensile strength of not less than 33,000 pounds per square inch.

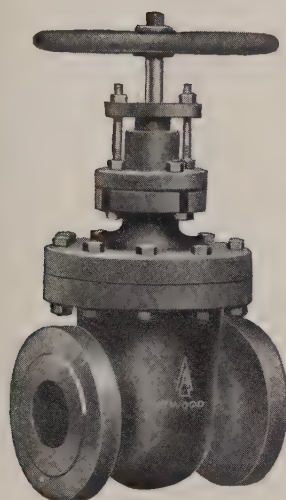
The discs are of solid bronze working against bronze seats. Stems are also bronze.

We are prepared to furnish valves with by-pass when so ordered.

The bore of these valves is made to suit XX strong pipe, see page 340.

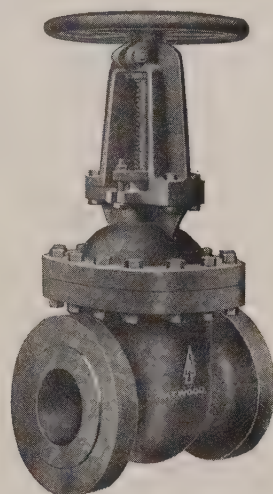
HYDRAULIC GATE VALVES No. 6 T **1000 POUNDS PITTSBURGH STANDARD** **SEMI-STEEL**

BRONZE MOUNTED. TAPER SEAT
1000 POUNDS WORKING PRESSURE—SHOCK



Inside Screw
Fig. 6011

The minimum opening through these valves is 100 per cent of the area of XX strong pipe.



Outside Screw
Fig. 6012

The bore of these valves is made to suit XX strong pipe. See page 340.

PRICE LIST

Size.....inches		1½	2	2½	3	4	5
Inside Screw	Screwed.....each	\$18.00	\$22.50	\$34.00	\$48.00	\$65.00	\$ 90.00
	Flanged.....each	20.00	25.50	39.00	53.00	70.00	98.00
Outside Screw	Screwed.....each	20.00	27.00	40.00	54.00	75.00	100.00
	Flanged.....each	22.00	30.00	45.00	59.00	80.00	108.00
Size.....inches		6	7	8	10	12	
Inside Screw	Screwed.....each	\$115.00					
	Flanged.....each	125.00	\$170.00	\$180.00	\$300.00	\$400.00	
	Flanged with By-Pass each	140.00	195.00	210.00	330.00	430.00	
Outside Screw	Screwed.....each	\$130.00					
	Flanged.....each	140.00	\$195.00	\$210.00	\$330.00	\$430.00	
	Flanged with By-Pass each	160.00	220.00	235.00	360.00	460.00	

These valves are suitable for the above pressure with all due allowance for water ram, line strains, etc. See page 260.

Bodies are of semi-steel with full bronze mountings, discs are solid bronze, stems are rolled bronze for outside screw and cast bronze for inside screw.

Valves will be furnished with both flanges male unless otherwise specified.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 282.

For drilling price list, see page 282.

For drilling template, see page 490.

For dimensions, see page 474.

For description, see page 260.

HYDRAULIC BRONZE GATE VALVES
FLANGED OR SCREWED
1000 POUNDS WORKING PRESSURE—SHOCK

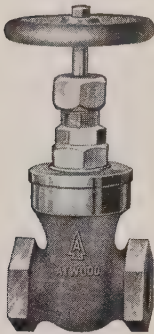


Fig. 678
Inside Screw Valve

The minimum
opening through
these valves is
100 per cent of
the pipe area.

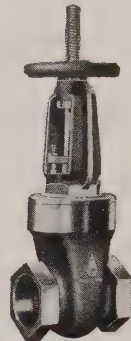


Fig. 6013
Outside Screw and Yoke Valve

PRICE LIST

Size..... inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Screwed Ends..... each	\$35.00	\$40.00	\$58.00	\$75.00
Flanged Ends..... each	45.00	50.00	70.00	90.00

For drilling price list, see page 282. For dimensions, see page 475.
For drilling template, see page 490.
Prices for Outside Screw and Yoke Valves on Application.



Fig. 6014

STRAIGHT WAY HYDRAULIC BRONZE COCKS
SCREWED ENDS
1000 POUNDS WORKING PRESSURE—SHOCK
PRICE LIST

Size..... inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Screwed..... each	\$12.00	\$13.50	\$15.00	\$17.50

For dimensions, see page 478. [262]

HYDRAULIC BRONZE STRAIGHTWAY COCKS

BALANCED KEY

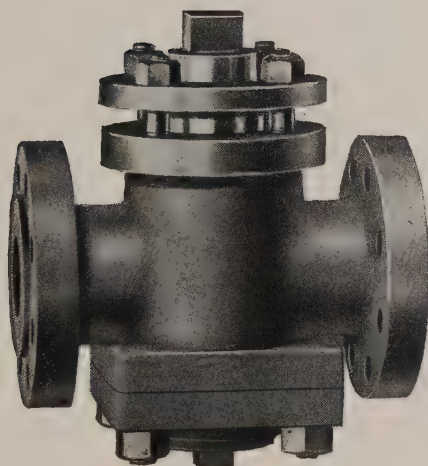
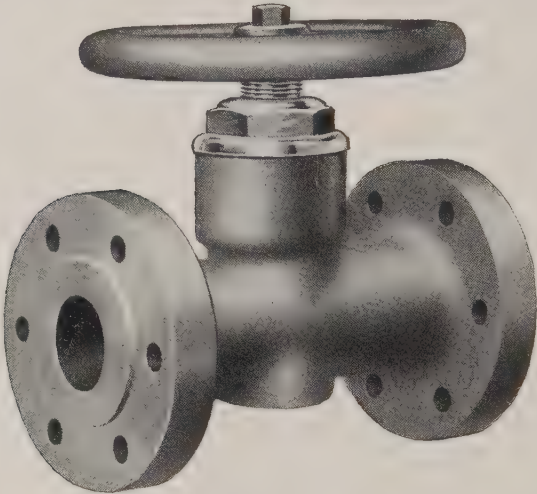


Fig. 558

Prices on Application

The construction of these cocks is such that the pressure tends to release the key when the cock is opened, and a threaded nut on the key seats it firmly and positively when in closed position. They are very durable and work easily under high pressures. Inquiries should state pressure and service. Dimensions for 500 pound cocks will be found on page 477.

HYDRAULIC BRONZE PLUG VALVES
1000 POUNDS PITTSBURGH STANDARD
1000 POUNDS WORKING PRESSURE—SHOCK



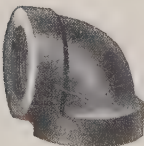
Plug Valve
Fig. 620

PRICE LIST

Size.....inches	1	1¼	1½	2	2½
Screwed.....each	\$26.00	\$40.00	\$55.00	\$80.00	\$100.00
Flanged.....each	46.00	60.00	80.00	115.00	150.00

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 282.
For dimensions, see page 476.
For drilling template, see page 490.
For drilling price list, see page 282

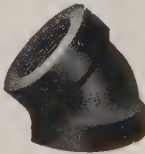
HYDRAULIC BRASS SCREWED
ELBOWS, TEES and 45 DEGREE ELBOWS
1000 POUNDS WORKING PRESSURE



90° Elbow
Fig. 621



Tee
Fig. 622



45° Elbow
Fig. 623

PRICE LIST

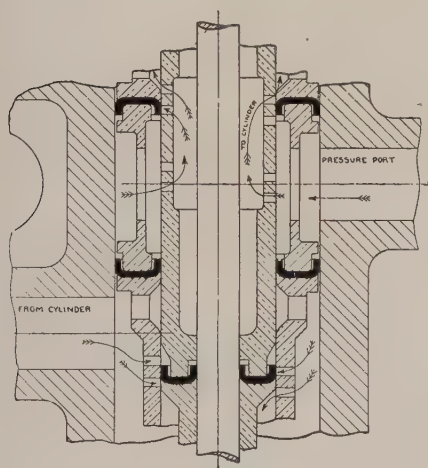
Size.....inches	½	¾	1	1¼	1½	2	2½
Elbows.....each	\$2.00	\$4.00	\$5.75	\$7.50	\$9.50	\$12.50	\$20.00
Tees.....each	2.50	5.00	7.50	10.00	12.50	17.50	28.00
45° Elbows.....each	Prices on Application						

For dimensions, see page 489.

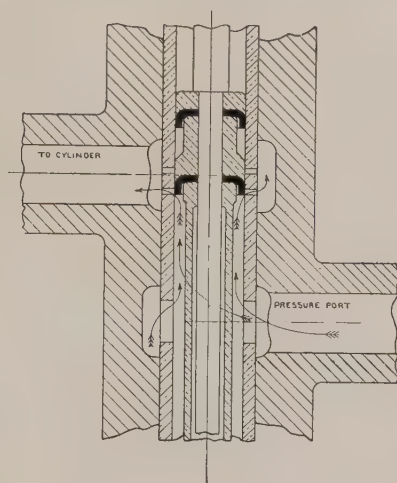
NOTES ON TANNER OPERATING VALVES

In our long experience with three-way and four-way valves for high pressures, we have found nothing better in the long run than a cup packed valve. Small leaks cut so rapidly that an all-metal valve is out of the question unless the water is absolutely clean, which is very seldom the case.

The design of the valve must be such that the fluid forces the packing away from instead of into the water ways as shown clearly in the cuts below.



Correct Design



Incorrect Design

Provision should be made for replacing any worn out part quickly and easily.

The Tanner Operating Valve is the outcome of long experience with many makes and styles of operating valves.

Bushings can be renewed with a minimum expense as all parts slip out of the body.

This gives an opportunity to make use of cup packings for every joint and eliminates the uncertainty of pressed fits. These valves are always absolutely tight and remain so for the life of the packing.

The arrangement of supply and waste ports facilitates attaching to manifolds. For three-inch and four-inch sizes at high pressures, the use of an actuating cylinder, as shown on pages 270 and 479, is desirable and should 2½-inch sizes be used where frequent operation is necessary

they should also be so equipped. Smaller sizes are easily manipulated by hand.

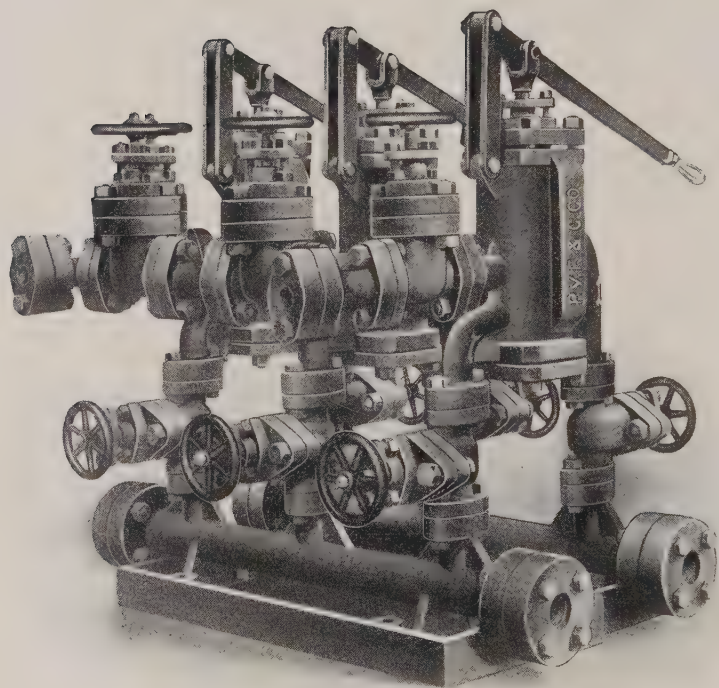
We have cases where these valves are operating at 2000 pounds and above. Special prices will be quoted for heavier service.

The actuating cylinder shown on pages 270 and 479 is an especially neat and valuable adjunct. It is self-centering and follows automatically the motion of a small pilot valve which may be placed at a distance from the main valve.

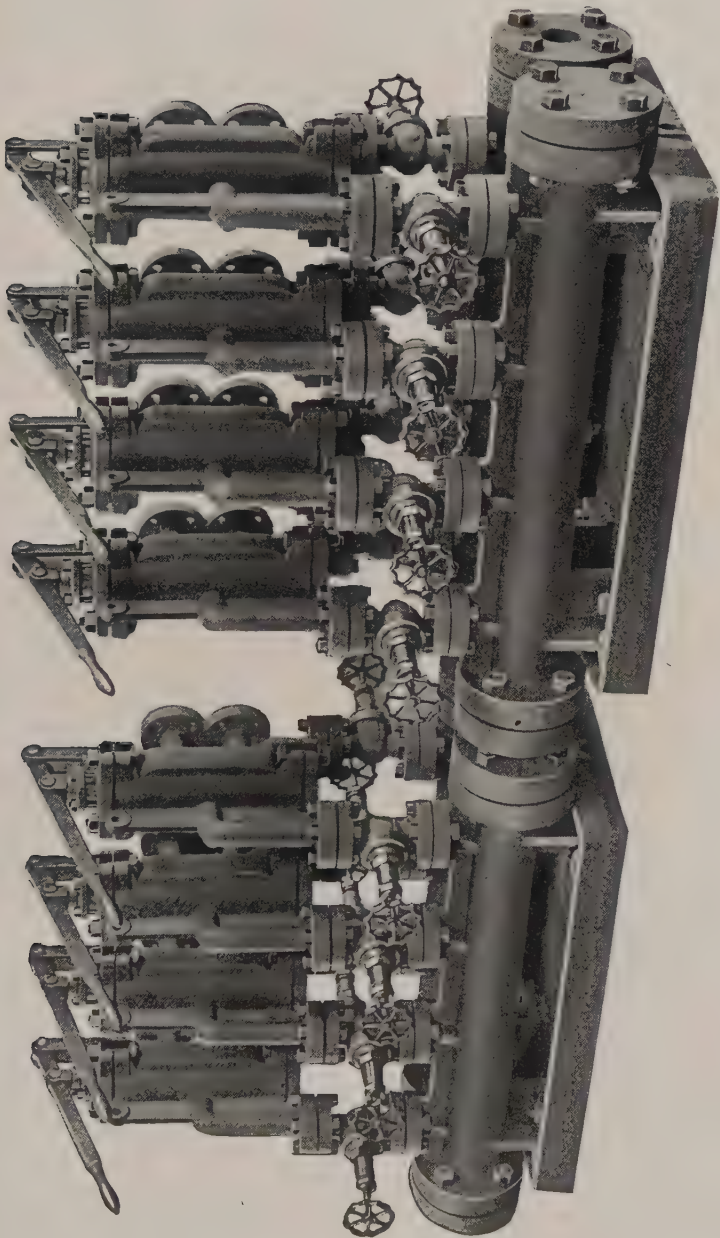




Hydraulic Manifold Fitted with Seven $\frac{3}{4}$ -inch Tanner Operating Valves



Hydraulic Manifold for Operating Furnace Bell. In Use at Toledo Furnace Co., Toledo, O., Adrian Furnace, DuBois, Pa., and Cambria Steel Co., Johnstown, Pa.



Hydraulic Manifolds Fitted up with $\frac{3}{4}$ -inch Valves. Built for American Tube and Stamping Co., Bridgeport, Conn.

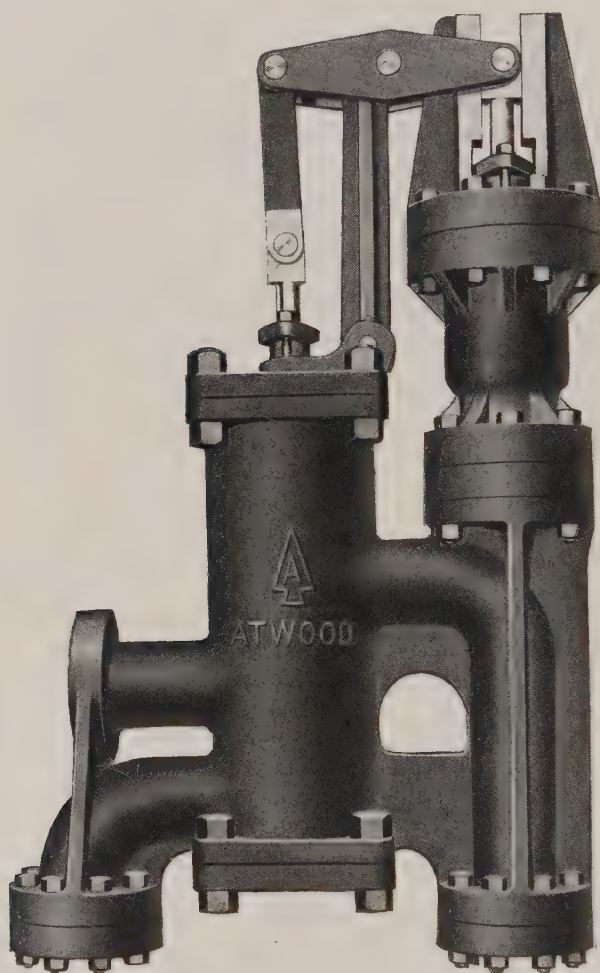


Fig. 611

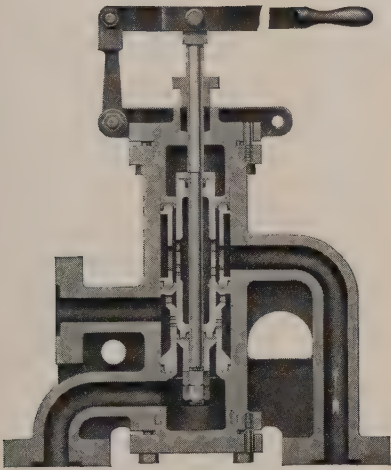
The above cut shows a 4-inch Tanner Operating Valve fitted with centering actuating cylinder. This arrangement permits of dismantling the valve without disturbing the cylinder or vice versa.

The actuating cylinder follows the movement of a pilot valve lever automatically and the pilot valve may be placed at any distance from main valve.

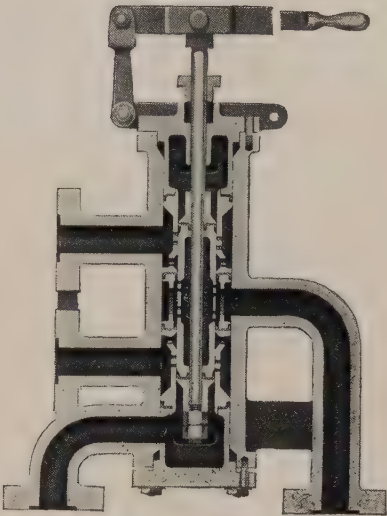
See page 479.

TANNER OPERATING VALVES
(PATENTED)

1000 POUNDS PITTSBURGH STANDARD
1000 POUNDS WORKING PRESSURE—HYDRAULIC



Three-Way
Fig. 612



Four-Way
Fig. 613

PRICE LIST

Size.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
3-Way.....each	\$65.00	\$100.00	\$120.00	\$145.00	\$185.00	\$240.00	Prices on Application	
4-Way.....each	75.00	110.00	130.00	160.00	200.00	270.00		

Extra for spotfacing and wooden protectors, see page 282.
For drilling template, see page 490.
For dimensions, see pages 480 and 481.
For description, see page 265.
For drilling price list, see page 282.

AIKEN OPERATING VALVES

Aiken Operating Valves were invented and for a long time manufactured by the late Henry Aiken from whose estate we purchased the rights and patterns.

They are made in bronze, or semi-steel bronze bushed, with either screwed or flanged ends, three-way for single and four-way for double acting cylinders.

Page 273 shows a section of Aiken Operating Valves.

They consist of two cylinders, cast in one body. These cylinders are connected by ports, terminating in annular chambers in each cylinder. The piston leathers that control these ports pass into these annular chambers but do not cross them. The pistons controlling these ports are arranged, in their relation to each other, in such manner that one acts as a cut-off for the other; motion given to one piston communicating a reverse motion to the other piston by means of the connecting walking beams.

The amount of water passed by the spools can be varied gradually and with great accuracy, so that the cylinder controlled by the valve can be operated without the objectionable jerking motion which results in the use of the ordinary valve. This is accomplished by making the portions of the valve plunger, which adjoin the packing ring, conical or taper shaped, as shown in the illustration, page 273, so that as the plunger is moved for the purpose of uncovering or covering the port of the valve, and operating or closing communication with the motor ports, it gradually enlarges or contracts the annular opening surrounding the plunger, so that the flow of water is opened or throttled, not abruptly but gradually. The advantages of this construction will be appreciated by those operating tools, such as rotating cylinders on large jib cranes, where great nicety of movement and perfect control of motion is required; and in many types of hydraulic mechanism this accuracy of operation is of the highest importance.

The sectional views shown on page 273 are those of the bronze body valve, but illustrate the piston of the Aiken throttling valve, both iron body and bronze, in four different positions on the receiving port. Figure 681 shows the piston in position on mid-stroke; Figure 682, on quarter-stroke; Figure 683, on half-stroke, and Figure 684 on full-stroke. These views will readily explain the manner of throttling the water while passing from one port to the other.

Aiken Valve Flanges do not agree with our 1000 pound standard, see pages 482 to 484.

For dimensions, see pages 482 to 485.

AIKEN OPERATING VALVES

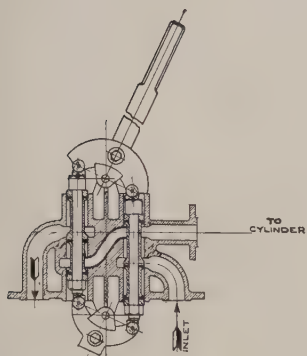


Fig. 679

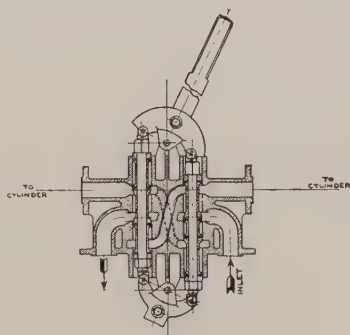


Fig. 680

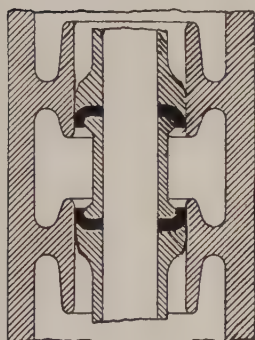


Fig. 681

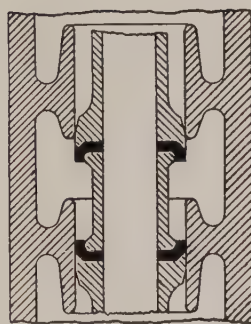


Fig. 682

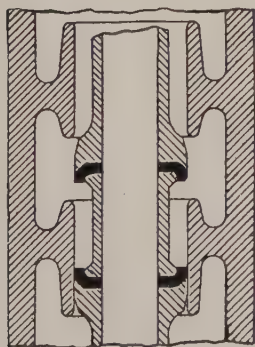


Fig. 683

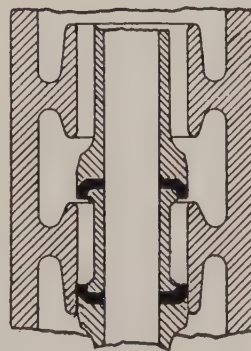
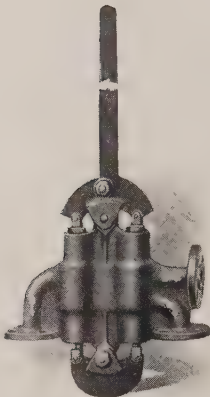


Fig. 684

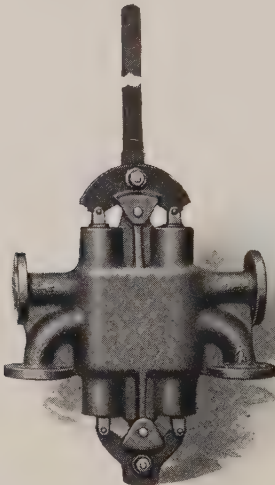
AIKEN OPERATING VALVES

BRONZE

1000 POUNDS WORKING PRESSURE—SHOCK



Three-way
Fig. 685



Four-way
Fig. 686

PRICE LISTS

Flanged

Size..... inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Three-way..... each	\$123.00	\$123.00	\$168.00	\$210.00	\$255.00	\$350.00	\$500.00	\$650.00
Four-way. each	150.00	150.00	205.00	255.00	305.00	415.00	600.00	800.00

Screwed

Size..... inches	1/2	3/4	1	1 1/4	1 1/2
Three-way..... each	\$123.00	\$123.00	\$168.00	\$210.00	\$255.00
Four-way..... each	150.00	150.00	205.00	255.00	305.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 282.

For drilling template, see page 482.

For description, see page 272.

For dimensions, see pages 482 and 483.

For drilling price list, see page 282.

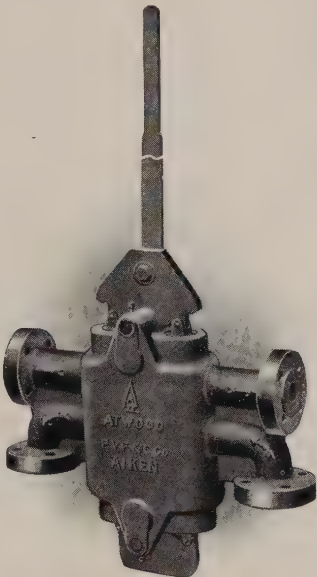
AIKEN OPERATING VALVES

SEMI-STEEL. BRONZE BUSHED

1000 POUNDS WORKING PRESSURE—SHOCK



Three-way
Fig. 687



Four-way
Fig. 688

PRICE LISTS

Flanged

Size.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Three-way.....each	\$123.00	\$155.00	\$185.00	\$220.00	\$285.00	\$400.00	\$520.00
Four-way.....each	135.00	175.00	220.00	260.00	345.00	490.00	655.00

Screwed

Size.....inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Three-way.....each	\$123.00	\$155.00	\$185.00	\$220.00
Four-way.....each	135.00	175.00	220.00	260.00

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 282.

For dimensions, see pages 484 and 485.

For drilling template, see page 484.

For drilling price list, see page 282.

For description, see page 272.

HYDRAULIC SPRING CUSHIONS OR
SHOCK VALVES

1000 POUNDS PITTSBURGH STANDARD
1000 POUNDS WORKING PRESSURE—SHOCK

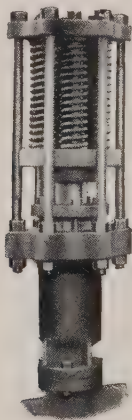


Fig. 614

PRICE LIST

Size.....inches	1	1¼	1½	2	2½	3	3½	4
Each	\$72.00	\$75.00	\$80.00	\$225.00	\$230.00	\$275.00	\$285.00	\$300.00

Extra for spotfacing and wooden protectors, see page 282.

These appliances, sometimes termed shock valves, are for the purpose of minimizing the effect of water ram by lengthening the time in which the moving body of water is brought to rest after the sudden closing of a valve.

They are a necessity in a high pressure system and should, if possible, be placed directly in the line of flow.

Where it is desired to cushion long mains these valves are sometimes arranged in batteries of two or more as may be required.

These valves can be designed for higher pressures. When ordering state the pressure required.

Prices for higher pressures than listed, upon application.

For drilling template, see page 490.

For dimensions, see page 486.

HYDRAULIC FLANGED FITTINGS

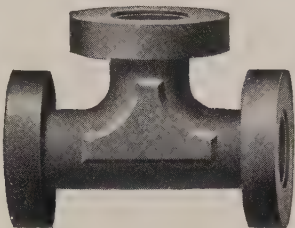
1000 POUNDS PITTSBURGH STANDARD

SEMI-STEEL

1000 POUNDS WORKING PRESSURE—SHOCK



90° Elbow
Fig. 607



Tee
Fig. 608

PRICE LIST

Elbows			Tees			Reducing Tees		
Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1	.....	.....	1	.....	.....	1	.....	.....
1¼	.....	.....	1¼	.....	.....	1¼	.....	.....
1½	\$15.00	\$17.00	1½	\$20.00	\$22.50	1½	\$20.00	\$22.50
2	17.00	19.00	2	22.50	25.00	2	22.50	25.00
2½	18.00	20.50	2½	24.00	27.00	2½	24.00	27.00
3	20.00	22.50	3	27.00	30.00	3	27.00	30.00
3½	22.50	26.00	3½	30.00	35.00	3½	30.00	35.00
4	26.00	30.00	4	35.00	40.00	4	35.00	40.00
4½	33.50	37.50	4½	45.00	50.00	4½	45.00	50.00
5	38.00	42.00	5	50.00	55.00	5	50.00	55.00
6	46.00	50.00	6	60.00	65.00	6	60.00	65.00
7	57.50	65.00	7	75.00	85.00	7	75.00	85.00
8	67.50	75.00	8	90.00	100.00	8	90.00	100.00
10	.....	.....	10	.....	.....	10	.....	.....

Tees will be furnished female all around unless otherwise specified and elbows one end male and other end female.

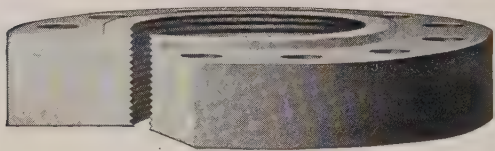
Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 490.

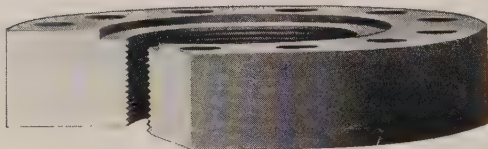
For dimensions, see pages 487 and 488.

The bore of all fittings is made to suit XX strong pipe. See page 340.

HYDRAULIC SCREWED FLANGES
1000 POUNDS PITTSBURGH STANDARD
SEMI-STEEL
1000 POUNDS WORKING PRESSURE—SHOCK



Male
Fig. 609



Female
Fig. 610

PRICE LIST

Size.....inches	1½	2	2½	3	3½	4	4½
Faced.....each	\$1.70	\$1.80	\$2.50	\$3.20	\$3.50	\$3.90	\$4.35
Faced and Drilled....each	1.85	2.00	2.75	3.50	3.85	4.25	4.75

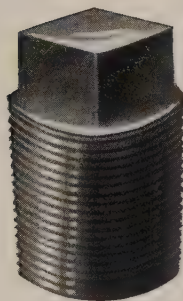
Size.....inches	5	6	7	8	9	10	12
Faced.....each	\$4.60	\$6.50	\$7.50	\$8.40	\$10.25	\$13.00	\$20.00
Faced and Drilled....each	5.00	7.00	8.00	9.00	11.00	14.00	22.50

If not ordered in pairs, state whether male or female is wanted.
For reducing and blind flanges add 50% to the above list.
Extra for spotfacing, and wooden protectors, see page 282.
For drilling template, see page 490.
For dimensions, see page 490.

HYDRAULIC PLUGS AND SOCKETS

BRASS SCREWED

1000 POUNDS WORKING PRESSURE—SHOCK



Plug
Fig. 6015



Socket
Fig. 6016

PRICE LIST — BRASS PLUGS

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Price.....each	\$0.75	\$1.25	\$1.75	\$2.75	\$4.00	\$6.25

PRICE LIST—BRASS SOCKETS

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	
Price.....each	\$1.50	\$2.50	\$3.75	\$5.00	\$6.25	

MACHINE BOLTS

PITTSBURGH HYDRAULIC STANDARD FOR 1000 POUNDS

MANUFACTURERS' STANDARD BOLTS

SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 490

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Number of Bolts	Size of Bolts For Flange and Flange Inches	One Set For Flange and Flange Each	Size of Bolts For Flange and Fitting Inches	One Set For Flange and Fitting Each	Size of Bolts For Fitting and Fitting Inches	One Set For Fitting and Fitting Each
$\frac{3}{4}$	4	$\frac{1}{2} \times 3\frac{1}{2}$	\$0.23	$\frac{1}{2} \times 3\frac{1}{4}$	\$0.23	$\frac{1}{2} \times 3$	\$0.23
1	4	$\frac{5}{8} \times 4\frac{1}{4}$	.37	$\frac{5}{8} \times 3\frac{3}{4}$	.35	$\frac{5}{8} \times 3\frac{1}{2}$	.33
$1\frac{1}{4}$	4	$\frac{5}{8} \times 4\frac{1}{2}$	.37	$\frac{5}{8} \times 4$	.35	$\frac{5}{8} \times 3\frac{3}{4}$	.35
$1\frac{1}{2}$	4	$\frac{3}{4} \times 5$	.54	$\frac{3}{4} \times 4\frac{1}{2}$	.51	$\frac{3}{4} \times 4$	.49
2	4	$\frac{7}{8} \times 5\frac{3}{4}$	.78	$\frac{7}{8} \times 5$	.71	$\frac{7}{8} \times 4\frac{1}{2}$	.68
$2\frac{1}{2}$	4	$\frac{7}{8} \times 6\frac{1}{4}$	.81	$\frac{7}{8} \times 5\frac{1}{2}$	.74	$\frac{7}{8} \times 4\frac{3}{4}$	.71
3	8	$\frac{3}{4} \times 6\frac{1}{4}$	1.22	$\frac{3}{4} \times 5\frac{1}{2}$	1.12	$\frac{3}{4} \times 4\frac{3}{4}$	1.07
$3\frac{1}{2}$	8	$\frac{7}{8} \times 6\frac{1}{2}$	1.61	$\frac{7}{8} \times 6$	1.55	$\frac{7}{8} \times 5\frac{1}{4}$	1.48
4	8	$1 \times 6\frac{3}{4}$	2.30	$1 \times 6\frac{1}{4}$	2.22	$1 \times 5\frac{1}{2}$	2.06
$4\frac{1}{2}$	8	$1\frac{1}{8} \times 7$	3.29	$1\frac{1}{8} \times 6\frac{3}{4}$	3.29	$1\frac{1}{8} \times 6\frac{1}{4}$	3.18
5	8	$1\frac{1}{8} \times 7\frac{1}{4}$	3.40	$1\frac{1}{8} \times 6\frac{3}{4}$	3.29	$1\frac{1}{8} \times 6\frac{1}{2}$	3.18
6	8	$1\frac{1}{4} \times 7\frac{1}{2}$	4.42	$1\frac{1}{4} \times 7\frac{1}{4}$	4.42	$1\frac{1}{4} \times 6\frac{3}{4}$	4.28
7	12	$1\frac{1}{4} \times 7\frac{3}{4}$	6.83	$1\frac{1}{4} \times 7\frac{1}{2}$	6.63	$1\frac{1}{4} \times 7$	6.42
8	12	$1\frac{1}{4} \times 8$	6.83	$1\frac{1}{4} \times 7\frac{3}{4}$	6.83	$1\frac{1}{4} \times 7\frac{1}{4}$	6.64
9	12	$1\frac{3}{8} \times 8\frac{1}{2}$	Prices on Application	$1\frac{3}{8} \times 8$	Prices on Application	$1\frac{3}{8} \times 7\frac{3}{4}$	Prices on Application
10	12	$1\frac{3}{8} \times 8\frac{1}{2}$		$1\frac{3}{8} \times 8\frac{1}{4}$		$1\frac{3}{8} \times 8$	
12	16	$1\frac{1}{2} \times 9$		$1\frac{1}{2} \times 8\frac{3}{4}$		$1\frac{1}{2} \times 8\frac{1}{2}$	

Unless otherwise specified bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

PITTSBURGH HYDRAULIC STANDARD FOR 1000 POUNDS

Drilled to template on page 490

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Size of Ring Gasket for Plain Face	Price of Ring Gasket for Plain Face Each	Size of Gasket for Male and Female	Price of Gasket for Male and Female. Each
$\frac{3}{4}$	$2\frac{3}{4} \times \frac{9}{16}$	\$0 .15	$1\frac{3}{4} \times \frac{9}{16}$	\$0 .15
1	$2\frac{7}{8} \times \frac{9}{16}$	.15	$2\frac{1}{4} \times \frac{9}{16}$	.15
$1\frac{1}{4}$	$3\frac{3}{8} \times \frac{7}{8}$	.15	$2\frac{1}{2} \times \frac{7}{8}$	.15
$1\frac{1}{2}$	4 x $1\frac{1}{8}$	.25	3 x $1\frac{1}{8}$	.15
2	$4\frac{5}{8} \times 1\frac{1}{2}$	.30	$3\frac{1}{2} \times 1\frac{1}{2}$	.20
$2\frac{1}{2}$	$5\frac{1}{8} \times 1\frac{3}{4}$	.30	4 x $1\frac{3}{4}$	.25
3	$6\frac{1}{4} \times 2\frac{1}{4}$	.50	$4\frac{3}{4} \times 2\frac{1}{4}$	.30
$3\frac{1}{2}$	$6\frac{5}{8} \times 2\frac{3}{4}$	.50	$5\frac{1}{4} \times 2\frac{3}{4}$	.30
4	$7\frac{1}{4} \times 3\frac{1}{8}$	.60	6 x $3\frac{1}{8}$	.40
$4\frac{1}{2}$	$8\frac{1}{8} \times 3\frac{5}{8}$	.90	$6\frac{5}{8} \times 3\frac{5}{8}$	.50
5	$8\frac{7}{8} \times 4\frac{1}{8}$	.90	$7\frac{1}{4} \times 4\frac{1}{8}$	.60
6	$10\frac{1}{2} \times 5\frac{1}{8}$	1 .00	$8\frac{1}{2} \times 5\frac{1}{8}$	.90
7	12 x 6	1 .50	$9\frac{5}{8} \times 6$	1 .00
8	$13\frac{1}{2} \times 6\frac{7}{8}$	1 .60	$10\frac{5}{8} \times 6\frac{7}{8}$	1 .00
9	$14\frac{7}{8} \times 8$	1 .75	$11\frac{3}{4} \times 8$	1 .10
10	$16\frac{3}{8} \times 9$	2 .50	$12\frac{3}{4} \times 9$	1 .65

“Ring” gaskets cover the face of flange from inside of bolts to inside of pipe.

DRILLING
SEMI-STEEL HYDRAULIC FLANGED VALVES
AND
BOLTING COMPANION FLANGES TO VALVES AND FITTINGS

PRICE LIST

Pipe Size Inches	Drilling Valves with Two Flanges Each	Bolting on Companion Flanges, Not Including Bolts or Gaskets For Labor Only			Furnishing and Bolting on Wooden Protectors Including 2 Bolts		
		Extra for Valve or Fitting with Two Flanges Net Each	Extra for Fitting with Three Flanges Net Each	Extra for Fitting with Four Flanges Net Each	Extra for Fitting or Valve with Two Flanges Net Each	Extra for Fitting or Valve with Three Flanges Net Each	Extra for Fitting with Four Flanges Net Each
1½	\$.80	\$.30	\$.45	\$.60	\$.40	\$.60	\$.80
2	1.00	.30	.45	.60	.40	.60	.80
2½	1.10	.50	.75	1.00	.40	.60	.80
3	1.20	.50	.75	1.00	.50	.75	1.00
3½	....	.50	.75	1.00	.50	.75	1.00
4	1.30	.50	.75	1.00	.50	.75	1.00
4½	....	.60	.90	1.20	.50	.75	1.00
5	2.25	.60	.90	1.20	.50	.75	1.00
6	3.00	.60	.90	1.20	.50	.75	1.00
7	5.00	.70	1.05	1.40	.60	.90	1.20
8	6.00	.70	1.05	1.40	.60	.90	1.20
10	8.00	.80	1.20	1.60	.70	1.05	1.40
12	9.00	.80	1.20	1.60	.70	1.05	1.40

Spotfacing bolt holes five cents net extra for each hole.

Hydraulic Gate Valves No. 6 T

1200 POUNDS HYDRAULIC AMERICAN STANDARD SEMI-STEEL

1200 Pounds Cold Water Working Pressure—Hydrostatic (no shock)

800 Pounds Cold Water Working Pressure—Shock

**1200 Pounds Air or Gas Working Pressure—Temperature Not
Exceeding 100 deg. Fahr.**

For this service we recommend our hydraulic taper seat pattern fully bronze mounted. Wherever possible all surfaces under pressure are either cylindrical or spherical segments.

The bodies and bonnets are made of semi-steel having a tensile strength of not less than 33,000 pounds per square inch.

The discs are of solid bronze working against bronze seats. Stems are also bronze.

We are prepared to furnish valves with by-pass when so ordered.

The bore of these valves is made to suit Double Extra Strong Pipe (see page 340).

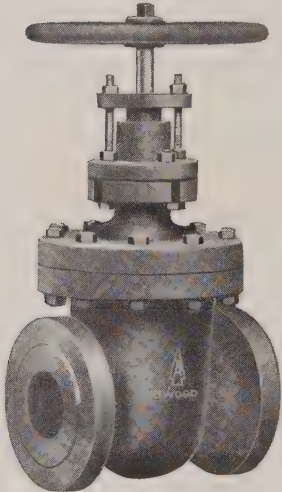
HYDRAULIC GATE VALVES No. 6 T

1200 POUNDS HYDRAULIC AMERICAN STANDARD
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT

1200 Pounds Cold Water Working Pressure—Hydrostatic (no shock)

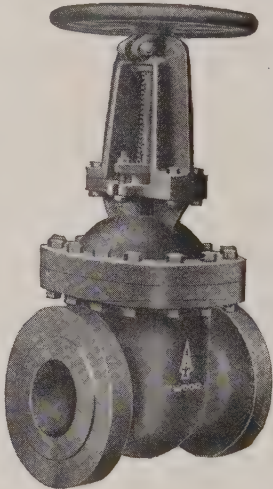
800 Pounds Cold Water Working Pressure—Shock

1200 Pounds Air or Gas Working Pressure—Temperature Not
Exceeding 100 deg. Fahr.



Inside Screw
Fig. 6017

The minimum
opening
through these
valves is 100
per cent of the
area of Extra
Strong Pipe



Outside Screw
Fig. 6018

The bore of these valves is made to suit Double Extra Strong Pipe. See page 340.

PRICE LIST

Size.....inches		1½	2	2½	3	4	5
Inside Screw	Screwed.....each	\$18.00	\$22.50	\$34.00	\$48.00	\$65.00	\$ 90.00
	Flanged.....each	20.00	25.50	39.00	53.00	70.00	98.00
Outside Screw	Screwed.....each	20.00	27.00	40.00	54.00	75.00	100.00
	Flanged.....each	22.00	30.00	45.00	59.00	80.00	108.00
Size.....inches		6	7	8	10	12	
Inside Screw	Screwed.....each	\$115.00					
	Flanged.....each	125.00	\$170.00	\$180.00	\$300.00	\$400.00	
	Flanged with By-pass ea.	140.00	195.00	210.00	330.00	430.00	
Outside Screw	Screwed.....each	\$130.00					
	Flanged.....each	140.00	\$195.00	\$210.00	\$330.00	\$430.00	
	Flanged with By-pass ea.	160.00	220.00	235.00	360.00	460.00	

Bodies of these valves are of semi-steel with full bronze mountings, discs are solid bronze, stems are rolled bronze for outside screw and cast bronze for inside screw.

Extra for spotfacing, labor attaching companion flanges, and wooden protectors, see page 282.

For drilling price list, see page 282.

For drilling template, see page 493.

For dimensions, see page 491.

For description, see page 283.

These valves are regularly furnished with raised face, but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.

HYDRAULIC FLANGED FITTINGS

1200 POUNDS HYDRAULIC AMERICAN STANDARD

SEMI-STEEL AND CAST STEEL

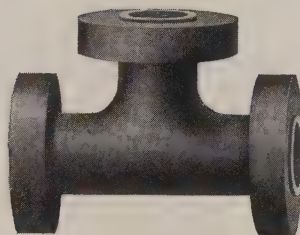
1200 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)

800 Pounds—Cold Water Working Pressure—Shock

**1200 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding
100 Deg. Fahr.**



**Elbows
Fig. 6019**



**Tees
Fig. 6020**

The bore of these fittings is made to suit extra strong pipe. See page 339.

PRICE LIST

90° Elbows			Tees		
Size Inches	Semi-Steel	Cast Steel	Size Inches	Semi-Steel	Cast Steel
	Faced and Drilled Not Spotfaced Each	Faced, Drilled and Spotfaced Each		Faced and Drilled Not Spotfaced Each	Faced, Drilled and Spotfaced Each
2	\$18.90	\$42.00	2	\$31.50	\$64.50
2½	22.80	49.20	2½	39.90	73.20
3	28.50	59.70	3	46.20	84.60
4	40.20	77.70	4	66.27	120.00
6	64.80	127.50	6	106.80	222.00
8	110.70	212.00	8	174.00	324.00
10	159.00	306.00	10	240.90	460.00
12	203.40	384.00	12	300.60	596.10

These fittings are regularly furnished with raised face, but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.

Tees are furnished female all around, and elbows with one face male and other face female, when special facings are ordered.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 493.

For dimensions, see page 492.

HYDRAULIC SCREWED FLANGES
1200 POUNDS HYDRAULIC AMERICAN STANDARD
SEMI-STEEL AND CAST STEEL

1200 Pounds —Cold Water Working Pressure —Hydrostatic (No Shock)
800 Pounds—Cold Water Working Pressure—Shock
1200 Pounds —Air or Gas Working Pressure—Temperature not Exceeding
100 Deg. Fahr.

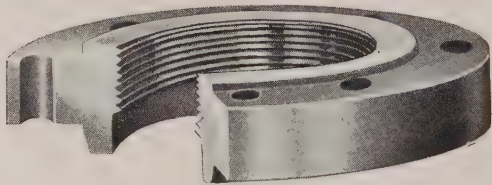


Fig. 6021

PRICE LIST

Size Inches	Semi-Steel	Cast Steel
	Faced and Drilled Not Spotfaced Each	Faced, Drilled and Spotfaced Each
1	\$ 4.30	\$14.25
1¼	5.30	16.80
1½	5.60	19.50
2	7.00	21.90
2½	9.00	24.60
3	11.20	27.00
4	13.90	35.40
6	25.00	52.50
8	33.00	72.00
10	40.00	94.00
12	50.00	117.00

These flanges are regularly furnished with raised face but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.
If not ordered in pairs, state whether male or female or tongue or groove is wanted.
For reducing and blind flanges, add 50% to the above list.
Extra for spotfacing and wooden protectors, see page 282.
For drilling template, see page 493.
For dimensions, see page 493.

MACHINE BOLTS

HYDRAULIC AMERICAN STANDARD FOR 1200 POUNDS MANUFACTURERS' STANDARD BOLTS

SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 493

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Number of Bolts	Size of Bolts for One Joint			Price Each for One Joint
		Flange and Flange	Flange and Fitting	Fitting and Fitting	
$\frac{1}{2}$	4	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2} \times 2\frac{1}{2}$	\$0.22
$\frac{3}{4}$	4	$\frac{1}{2} \times 2\frac{3}{4}$	$\frac{1}{2} \times 2\frac{3}{4}$	$\frac{1}{2} \times 2\frac{3}{4}$	.22
1	4	$\frac{5}{8} \times 3\frac{1}{4}$	$\frac{5}{8} \times 3\frac{1}{4}$	$\frac{5}{8} \times 3\frac{1}{4}$	.33
$1\frac{1}{4}$	4	$\frac{5}{8} \times 3\frac{1}{2}$	$\frac{5}{8} \times 3\frac{1}{2}$	$\frac{5}{8} \times 3\frac{1}{2}$	.33
$1\frac{1}{2}$	4	$\frac{3}{4} \times 3\frac{3}{4}$	$\frac{3}{4} \times 3\frac{3}{4}$	$\frac{3}{4} \times 3\frac{3}{4}$	.48
2	8	$\frac{3}{4} \times 4$	$\frac{7}{8} \times 4$	$\frac{7}{8} \times 4$	1.36
$2\frac{1}{2}$	8	$\frac{7}{8} \times 4\frac{1}{2}$	$\frac{7}{8} \times 4\frac{1}{2}$	$\frac{7}{8} \times 4\frac{1}{2}$	1.36
3	8	$\frac{7}{8} \times 4\frac{3}{4}$	$\frac{7}{8} \times 4\frac{3}{4}$	$\frac{7}{8} \times 4\frac{3}{4}$	1.42
$3\frac{1}{2}$	8	1 x $5\frac{1}{4}$	1 x $5\frac{1}{4}$	1 x $5\frac{1}{4}$	2.06
4	8	1 x $5\frac{1}{2}$	1 x $5\frac{1}{2}$	1 x $5\frac{1}{2}$	2.14
$4\frac{1}{2}$	8	$1\frac{1}{8} \times 6$	$1\frac{1}{8} \times 6$	$1\frac{1}{8} \times 6$	3.18
5	8	$1\frac{1}{8} \times 6\frac{1}{4}$	$1\frac{1}{8} \times 6\frac{1}{4}$	$1\frac{1}{8} \times 6\frac{1}{4}$	3.18
6	12	$1\frac{1}{8} \times 6\frac{1}{2}$	$1\frac{1}{8} \times 6\frac{1}{2}$	$1\frac{1}{8} \times 6\frac{1}{2}$	4.93
7	12	$1\frac{1}{4} \times 7$	$1\frac{1}{4} \times 7$	$1\frac{1}{4} \times 7$	6.42
8	12	$1\frac{3}{8} \times 7\frac{3}{4}$	$1\frac{3}{8} \times 7\frac{3}{4}$	$1\frac{3}{8} \times 7\frac{3}{4}$	Prices on Applica- tion
9	16	$1\frac{3}{8} \times 8$	$1\frac{3}{8} \times 8$	$1\frac{3}{8} \times 8$	
10	16	$1\frac{3}{8} \times 8\frac{1}{4}$	$1\frac{3}{8} \times 8\frac{1}{4}$	$1\frac{3}{8} \times 8\frac{1}{4}$	
12	20	$1\frac{3}{8} \times 8\frac{1}{2}$	$1\frac{3}{8} \times 8\frac{1}{2}$	$1\frac{3}{8} \times 8\frac{1}{2}$	

Unless otherwise specified bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to the above list.

GASKETS

1200 POUNDS HYDRAULIC AMERICAN STANDARD

For template, see page 493

PRICE LIST FOR ONE JOINT

Pipe Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Size of Ring Gasket	$2\frac{1}{2}\times 1\frac{1}{2}$	$2\frac{7}{8}\times 3\frac{3}{4}$	$3\frac{3}{8}\times 1\frac{5}{16}$	$3\frac{3}{4}\times 1\frac{1}{4}$	$4\frac{1}{8}\times 1\frac{1}{2}$	$5\frac{1}{8}\times 1\frac{7}{8}$
Price.....each	\$0.15	\$0.15	\$0.20	\$0.20	\$0.25	\$0.40
Pipe Size.....inches	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5
Size of Ring Gasket	$5\frac{5}{8}\times 2\frac{1}{4}$	$6\frac{5}{8}\times 2\frac{3}{4}$	$7\frac{1}{2}\times 3\frac{1}{4}$	$8\frac{1}{4}\times 3\frac{3}{4}$	$9\frac{3}{8}\times 4\frac{1}{4}$	$10\frac{3}{8}\times 4\frac{3}{4}$
Price.....each	\$0.45	\$0.60	\$0.75	\$0.90	\$1.10	\$1.35
Pipe Size.....inches	6	7	8	9	10	12
Size of Ring Gasket	$11\frac{3}{8}\times 5\frac{3}{4}$	$12\frac{1}{2}\times 6\frac{3}{4}$	$14\frac{1}{8}\times 7\frac{5}{8}$	$15\frac{5}{8}\times 8\frac{3}{4}$	$17\frac{1}{8}\times 9\frac{3}{4}$	$19\frac{5}{8}\times 11\frac{3}{4}$
Price.....each	\$1.55	\$1.75	\$2.25	\$2.65	\$3.15	\$3.90

"Ring" Gaskets cover the face of flange from inside of bolts to inside of pipe.

Stuart Two Pressure Operating Valve—Type B

The Stuart Two Pressure Operating Valve was designed for use with any press supplied with both high and low hydraulic pressures, such as rubber presses, tire heaters, Bakelite presses, pipe testers, etc.

Our Type A Valve, which was placed on the market in 1914, proved such an advantage over the old cumbersome and wasteful method of using three globe valves and one check valve, that wherever trials were made the increase in production and the saving in high pressure water and labor resulted in its adoption.

Our long experience in supplying Two Pressure Hydraulic Valves has enabled us to develop several marked improvements which are incorporated in our Type B Valve.

For years we have been experimenting with various materials to secure a packer which would give longer service than the ordinary leather cup and with our Type B Valve, herein described, we are offering to the trade a packer that is a great improvement, as tests have demonstrated that the life of packers in the Type B Valve is many times that of a leather cup packer.

Our Type B Valve consists essentially of a Low Pressure Valve, a High Pressure Valve, a Waste Valve and a Check Valve. The Check Valve is of the leather faced lift type, while all other valves are of the piston type packed with rings of hydraulic duck packing. All of these packers may be quickly and cheaply renewed when worn out.

The Low Pressure Inlet Valve and the Exhaust Valve are operated by a single lever which has three working positions as follows:

When the lever is in central position all valves are closed and the ram of the press is stationary. When the lever is pulled up the Low Pressure Inlet Valve will open and the ram will rise using low pressure water only. When the lever is pushed down the Exhaust Valve will open and the ram will be lowered.

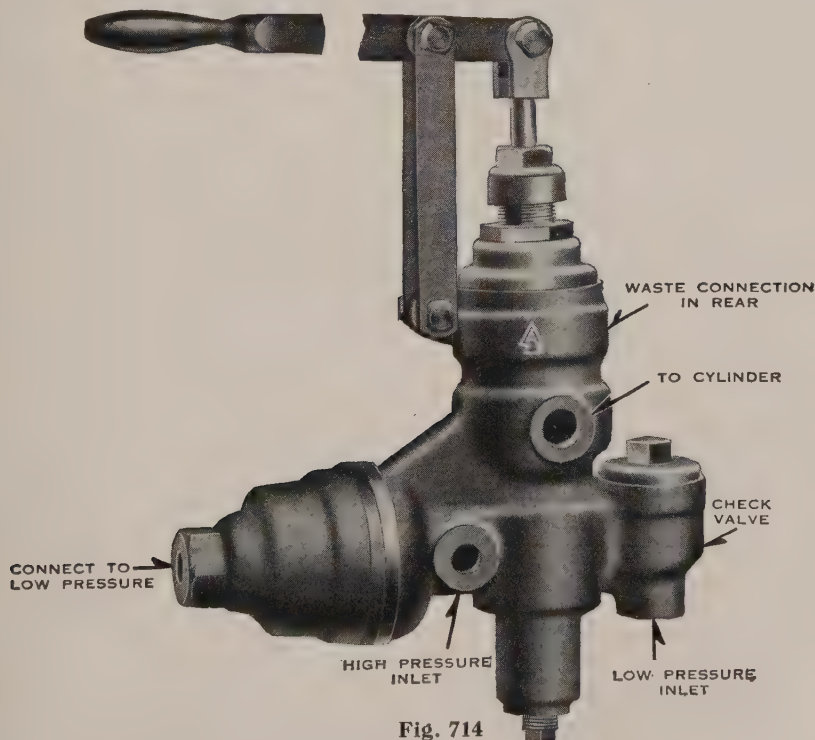


Fig. 714

Stuart Two Pressure Operating Valve
Patented July 25, 1916. Other Patents Pending

The action of the High Pressure Valve is entirely automatic and this valve opens only when the molds come against the cover of the heater. This automatic action is brought about by the increased load on the ram of the press when the molds come in contact with the cover. Variations of pressure in either the high or low pressure supply lines will in no way affect the proper automatic action of the high pressure valve and no adjustment is necessary when installing or repacking the Valves.

This automatic feature makes it impossible for the operator to forget to turn on the high pressure water and, inasmuch as the high pressure water is cut off before the exhaust valve opens, he cannot allow it to escape to the sewer, nor can he use high pressure water for raising the ram.

The Check Valve prevents the high pressure water from backing into the low pressure line. The particular Check Valve used is one that may be depended upon to be tight over long periods without attention.

The simple lever arrangement allows the operator no excuse for becoming confused as is sometimes the case when three valves are used.

Following is a list of standard sizes manufactured and the pressures for which they have been designed:

Size of High Pressure Connection	Size of Low Pressure Connection	Size of Waste Connection	Size of Press Connection	High Pressure	*Low Pressure
$\frac{1}{2}$ $\frac{3}{4}$	$\frac{3}{4}$ $1\frac{1}{2}$	$\frac{3}{4}$ $1\frac{1}{2}$	$\frac{3}{4}$ $1\frac{1}{2}$	2000 lbs. 2000 lbs.	Any Pressure greater than 125 lbs.

The $\frac{1}{2} \times \frac{3}{4}$ -inch Valve is used for small accessory presses. The $\frac{3}{4} \times 1\frac{1}{2}$ -inch Valve is the size best suited for tire heaters having a 24-inch ram or smaller.

*If the low pressure is less than 125 lbs. a special part is necessary.

Information on larger sizes will be furnished on request.

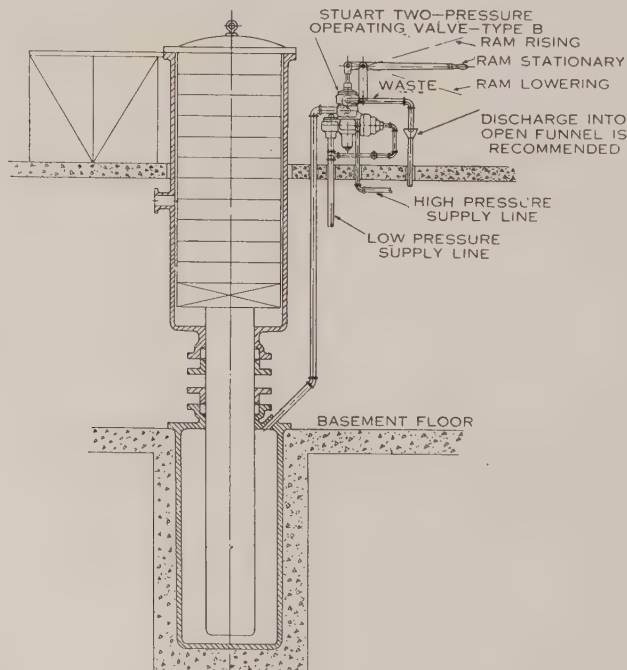


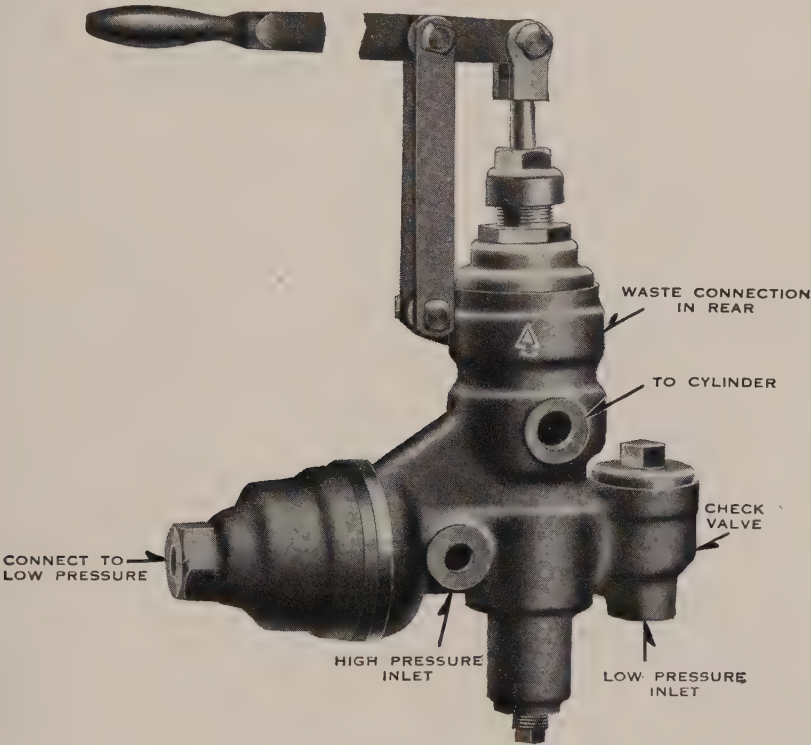
Fig. 715

STUART TWO PRESSURE HYDRAULIC
OPERATING VALVE—TYPE B

2000 POUNDS WORKING PRESSURE

HIGH PRESSURE—2000 POUNDS—SHOCK

LOW PRESSURE—ANY PRESSURE ABOVE 125 POUNDS



Stuart Two Pressure Operating Valve
Fig. 716

PRICE LIST

Size.....inches	$\frac{1}{2} \times \frac{3}{4}$	$\frac{3}{4} \times 1\frac{1}{2}$	$\frac{3}{4} \times 2 \times 2\frac{1}{2}$
Low Pressure Connection.....	$\frac{3}{4}$	$1\frac{1}{2}$	2
High Pressure Connection.....	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
Waste Connection.....	$\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$
Each.....	Prices on Application		

Note.—When pressure on Low Pressure side is below 125 pounds per square inch, a special part is necessary.

For description, see pages 289 to 290. For dimensions, see page 494.

HYDRAULIC BRONZE GLOBE AND
ANGLE VALVES

1500 TO 3000 POUNDS WORKING PRESSURE



Globe Valve
Fig 615.

Size Inches	Working Pressure Pounds per Square Inch
$\frac{1}{2}$ and $\frac{3}{4}$	3000
1 and $1\frac{1}{4}$	2500
$1\frac{1}{2}$ and 2	1500



Angle Valve
Fig. 616

PRICE LIST

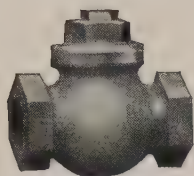
Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Screwed.....each	\$14.00	\$17.50	\$21.50	\$31.00	\$36.50	\$42.50

For dimensions, see page 495.

HYDRAULIC BRONZE CHECK VALVES

1500 TO 3000 POUNDS WORKING PRESSURE

(See note below)



Horizontal Lift
Fig. 617



Angle Lift
Fig. 618

PRICE LIST

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Screwed.....each	\$12.60	\$15.75	\$19.50	\$28.00	\$33.00	\$38.25

For dimensions, see page 495.

HYDRAULIC BRONZE SCREWED UNIONS

1500 TO 3000 POUNDS WORKING PRESSURE

(See note below)

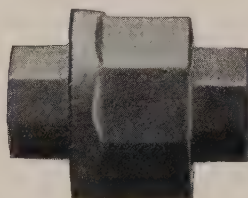


Fig. 619

PRICE LIST

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Each.....	\$5.00	\$6.25	\$7.50	\$12.50	\$22.00

For dimensions, see page 496.

Working Pressures

Size.....inches	$\frac{1}{2}$ and $\frac{3}{4}$	1 and $1\frac{1}{4}$	$1\frac{1}{2}$ and 2
Working Pressure Pounds per Square Inch	3000	2500	1500

HYDRAULIC GATE VALVES No. 7 T
3000 POUND HYDRAULIC AMERICAN STANDARD
CAST STEEL

3000 Pounds Cold Water Working Pressure—Hydrostatic (no shock)

2000 Pounds Cold Water Working Pressure—Shock

**3000 Pounds Air or Gas Working Pressure—Temperature Not
Exceeding 100 deg. Fahr.**

For this service we recommend our cast steel taper seat pattern, fully bronze mounted. Wherever possible all surfaces under pressure are either cylindrical or spherical segments.

The bodies and bonnets are made of cast steel (see page 295).

The discs are of solid bronze working against bronze seats. Stems are also bronze.

We are prepared to furnish valves with by-pass when so ordered.

The bore of these valves is the same as XX strong pipe.

HYDRAULIC GATE VALVES No. 7 T

3000 POUND HYDRAULIC AMERICAN STANDARD
CAST STEEL. BRONZE MOUNTED. TAPER SEAT

3000 Pounds Cold Water Working Pressure—Hydrostatic (no shock)

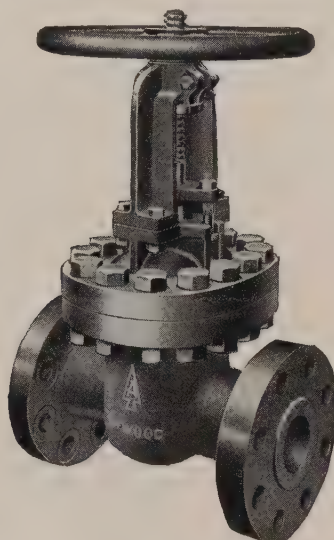
2000 Pounds Cold Water Working Pressure—Shock

3000 Pounds Air or Gas Working Pressure—Temperature Not
Exceeding 100 deg. Fahr.

The minimum opening through these valves is 100 per
cent of the area of XX strong pipe



Inside Screw
Fig. 712



Outside Screw and Yoke
Fig. 717

PRICE LIST Outside Screw and Yoke

Size inches	2	2½	3	4	5	6
Screwed Ends each	\$95.00	\$115.00	\$135.00	\$160.00	\$200.00	\$285.00
Flanged Ends each	100.00	120.00	145.00	170.00	210.00	300.00
Extra for Drilling and Spot- facing each	4.00	5.00	5.00	6.00	9.00	10.00
Extra for By-pass each	....	....	....	50.00	50.00	50.00

Inside Screw

Size inches	2	2½	3	4	5	6
Screwed Ends each	\$90.00	\$110.00	\$130.00	\$150.00	\$190.00	\$270.00
Flanged Ends each	95.00	115.00	140.00	160.00	200.00	285.00
Extra for Drilling and Spot- facing each	4.00	5.00	5.00	6.00	9.00	10.00
Extra for By-pass each	....	....	....	50.00	50.00	50.00

The opening in these valves is the same as XX strong pipe.

Bodies of these valves are of cast steel with full bronze mountings, discs are solid bronze, stems are rolled bronze for outside screw and cast bronze for inside screw.

Extra for attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 500.

For dimensions, see page 497.

For description, see page 294.

These valves are regularly furnished with raised face but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.

HYDRAULIC SWING CHECK VALVES

CAST STEEL. BRONZE MOUNTED

3000 POUNDS HYDRAULIC AMERICAN STANDARD

3000 Pounds Cold Water Working Pressure—Hydrostatic (no shock)

2000 Pounds Cold Water Working Pressure—Shock

**3000 Pounds Air or Gas Working Pressure—Temperature Not
Exceeding 100 deg. Fahr.**

**The minimum opening through these valves is 100 per cent
of the area of XX strong pipe**



**Horizontal Swing Check Valve
Fig. 730**

The bore of these valves is made to suit XX strong pipe. See page 340.
For use in a horizontal line or for upward flow.

PRICE LIST

Size.....inches	2½	3	4	5	6
Screwed.....each	\$85.00	\$105.00	\$120.00	\$160.00	\$210.00
Flanged.....each	90.00	115.00	130.00	170.00	225.00
Extra for Drilling and Spotfacing}.....each	5.00	5.00	6.00	9.00	10.00

Extra for attaching companion flanges and wooden protectors, see page 282.

For dimensions, see page 498.

For drilling template, see page 500.

When ordering, state whether flanged or screwed.

These valves are regularly furnished with raised face but can be furnished with Male and Female or Tongue and Groove faces at an extra cost, if so ordered.

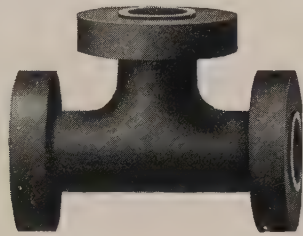
HYDRAULIC FLANGED FITTINGS

3000 POUNDS HYDRAULIC AMERICAN STANDARD
CAST STEEL

3000 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)
2000 Pounds—Cold Water Working Pressure—Shock
3000 Pounds—Air or Gas Working Pressure—Temperature not Exceeding
100 Deg. Fahr.



Elbows
Fig. 718



Tees
Fig. 719

PRICE LIST

90° Elbows		Tees	
Size Inches	Cast Steel	Size Inches	Cast Steel
	Faced, Drilled and Spotfaced Each		Faced, Drilled and Spotfaced Each
2	\$66 .90	2	\$98 .10
2½	80 .10	2½	120 .00
3	94 .50	3	138 .00
4	120 .00	4	178 .50
6	183 .60	6	286 .50
8	268 .50	8	408 .00
10	381 .90	10	569 .10
12	481 .80	12	729 .90

These fittings are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove, if so ordered.

Tees are furnished female all around, and elbows with one face male and other face female, when special facings are ordered.

Extra for labor attaching companion flanges and wooden protectors, see page 282.

The bore of these fittings is made to suit XX strong pipe. See page 340.

For drilling template, see page 500.

For dimensions, see page 499.

HYDRAULIC FLANGES—CAST STEEL

3000 POUNDS HYDRAULIC AMERICAN STANDARD

3000 Pounds —Cold Water Working Pressure —Hydrostatic (No Shock)

2000 Pounds—Cold Water Working Pressure—Shock

3000 Pounds —Air or Gas Working Pressure—Temperature not Exceeding
100 Deg. Fahr.

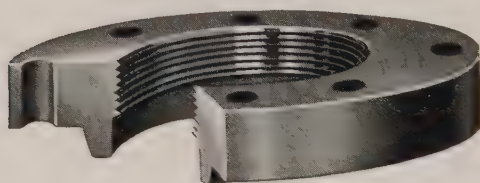


Fig. 720

PRICE LIST

Size Inches	Cast Steel	||	Size Inches	Cast Steel
	Faced, Drilled and Spotfaced Each			Faced, Drilled and Spotfaced Each
1	\$16 .00	||	4	\$39 .00
1 $\frac{1}{4}$	18 .50	||	6	58 .50
1 $\frac{1}{2}$	22 .40	||	8	80 .00
2	24 .50	||	10	103 .00
2 $\frac{1}{2}$	27 .50	||	12	130 .00
3	30 .00			

These flanges are regularly furnished with plain face but can be furnished with Male and Female or Tongue and Groove faces, if so ordered.

If not ordered in pairs, state whether male or female or tongue or groove is wanted

Extra for labor attaching wooden protectors, see page 282.

For reducing and blind flanges, add 50% to the above list.

For drilling templates, see page 500.

For dimensions, see page 500.

MACHINE BOLTS

HYDRAULIC AMERICAN STANDARD FOR 3000 POUNDS

MANUFACTURERS' STANDARD BOLTS

SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 500

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Number of Bolts	Size of Bolts for One Joint			Price Each for One Joint
		Flange and Flange	Flange and Fitting	Fitting and Fitting	
1/2	4	1/2 x 2 3/4	1/2 x 2 3/4	1/2 x 2 3/4	\$0 .22
3/4	4	5/8 x 3	5/8 x 3	5/8 x 3	.31
1	4	5/8 x 3 1/4	5/8 x 3 1/4	5/8 x 3 1/4	.33
1 1/4	4	3/4 x 3 1/2	3/4 x 3 1/2	3/4 x 3 1/2	.48
1 1/2	4	7/8 x 4	7/8 x 4	7/8 x 4	.65
2	8	7/8 x 4 1/4	7/8 x 4 1/4	7/8 x 4 1/4	1 .36
2 1/2	8	7/8 x 4 1/2	7/8 x 4 1/2	7/8 x 4 1/2	1 .35
3	8	1 x 4 3/4	1 x 4 3/4	1 x 4 3/4	1 .97
3 1/2	8	1 x 5 1/4	1 x 5 1/4	1 x 5 1/4	2 .06
4	8	1 1/8 x 5 3/4	1 1/8 x 5 3/4	1 1/8 x 5 3/4	3 .07
4 1/2	8	1 1/4 x 6	1 1/4 x 6	1 1/4 x 6	4 .14
5	8	1 1/4 x 6 1/4	1 1/4 x 6 1/4	1 1/4 x 6 1/4	4 .14
6	12	1 1/4 x 6 1/2	1 1/4 x 6 1/2	1 1/4 x 6 1/2	6 .42
7	12	1 3/8 x 7 1/4	1 3/8 x 7 1/4	1 3/8 x 7 1/4	Prices on Applica- tion
8	12	1 1/2 x 7 3/4	1 1/2 x 7 3/4	1 1/2 x 7 3/4	
9	16	1 1/2 x 8	1 1/2 x 8	1 1/2 x 8	
10	16	1 1/2 x 8 1/4	1 1/2 x 8 1/4	1 1/2 x 8 1/4	
12	20	1 1/2 x 8 1/2	1 1/2 x 8 1/2	1 1/2 x 8 1/2	

Unless otherwise specified bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

3000 POUNDS HYDRAULIC AMERICAN STANDARD

For template, see page 500

PRICE LIST FOR ONE JOINT

Pipe Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Size of Ring Gasket.	$2\frac{1}{2} \times \frac{3}{8}$	$2\frac{3}{4} \times \frac{1}{2}$	$3\frac{3}{8} \times \frac{3}{4}$	$3\frac{5}{8} \times \frac{15}{16}$	$4 \times 1\frac{1}{4}$	$5\frac{1}{8} \times 1\frac{1}{2}$
Price..... each	\$0.15	\$0.15	\$0.20	\$0.20	\$0.25	\$0.40
Pipe Size.....inches	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5
Size of Ring Gasket.	$5\frac{5}{8} \times 1\frac{7}{8}$	$6\frac{1}{2} \times 2\frac{1}{4}$	$7\frac{1}{2} \times 2\frac{3}{4}$	$8\frac{1}{8} \times 3\frac{1}{4}$	$9\frac{1}{4} \times 3\frac{3}{4}$	$10\frac{1}{4} \times 4\frac{1}{4}$
Price..... each	\$0.45	\$0.60	\$0.80	\$0.90	\$1.15	\$1.40
Pipe Size.....inches	6	7	8	9	10	12
Size of Ring Gasket.	$11\frac{1}{4} \times 4\frac{3}{4}$	$12\frac{3}{8} \times 5\frac{3}{4}$	$14 \times 6\frac{3}{4}$	$15\frac{1}{2} \times 7\frac{5}{8}$	$17 \times 8\frac{3}{4}$	$19\frac{1}{2} \times 10\frac{3}{4}$
Price..... each	\$1.65	\$1.90	\$2.40	\$2.50	\$3.35	\$4.20

“Ring” Gaskets cover the face of flange from inside of bolt to inside of pipe.

HYDRAULIC GATE VALVES No. 8 T
3000 POUNDS PITTSBURGH STANDARD
CAST STEEL
3000 POUNDS WORKING PRESSURE—SHOCK

Although we have adopted the Hydraulic American Standards, we are in a position to furnish material for our previous 3000 pound Hydraulic line, now known as the 3000 Pounds Pittsburgh Standard. There has been no change in this line as to drilling or dimensions.

For this service we recommend our cast steel taper seat pattern, fully bronze mounted. Wherever possible all surfaces under pressure are either cylindrical or spherical segments.

The bodies and bonnets are made of cast steel (see page 302).

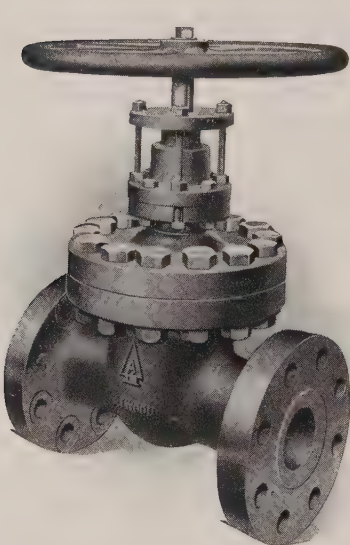
The discs are of solid bronze working against bronze seats. Stems are also bronze.

We are prepared to furnish valves with by-pass when so ordered.

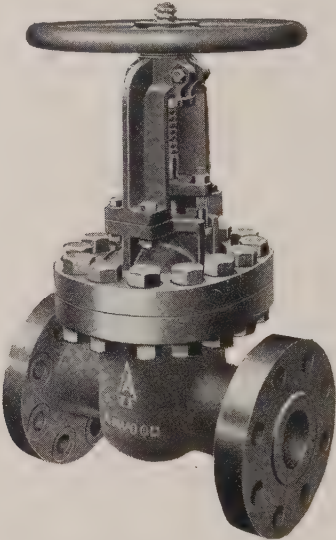
The bore of these valves is made to suit XX strong pipe.

HYDRAULIC GATE VALVES No. 8 T
3000 POUNDS PITTSBURGH STANDARD
CAST STEEL. BRONZE MOUNTED. TAPER SEAT
3000 POUNDS WORKING PRESSURE—SHOCK

The minimum opening through these valves is 100 per cent
of the area of XX strong pipe



Inside Screw
Fig. 827



Outside Screw and Yoke
Fig. 840

PRICE LIST
Outside Screw and Yoke

Size.....inches	2	2½	3	4	5	6
Screwed Ends.....each	\$95.00	\$115.00	\$135.00	\$160.00	\$200.00	\$285.00
Flanged Ends.....each	100.00	120.00	145.00	170.00	210.00	300.00
Extra for Drilling and Spot- facing.....each	4.00	5.00	5.00	6.00	9.00	10.00
Extra for By-pass.....each	....	....	....	50.00	50.00	50.00

Inside Screw

Size.....inches	2	2½	3	4	5	6
Screwed Ends.....each	\$90.00	\$110.00	\$130.00	\$150.00	\$190.00	\$270.00
Flanged Ends.....each	95.00	115.00	140.00	160.00	200.00	285.00
Extra for Drilling and Spot- facing.....each	4.00	5.00	5.00	6.00	9.00	10.00
Extra for By-pass.....each	....	....	....	50.00	50.00	50.00

The opening in these valves is the same as XX strong pipe. See page 340.

Bodies of these valves are cast steel with full bronze mountings, discs are solid bronze,
stems are rolled bronze for outside screw and cast bronze for inside screw.

Extra for attaching companion flanges and wooden protectors, see page 282.

For drilling template, see page 505.

For dimensions, see page 501.

For description, see page 301.

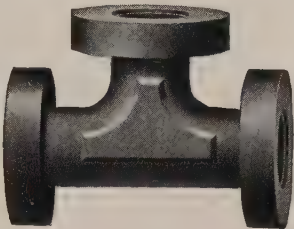
HYDRAULIC FLANGED FITTINGS

**3000 POUNDS PITTSBURGH STANDARD
CAST STEEL**

3000 POUNDS WORKING PRESSURE—SHOCK



**Elbows
Fig. 831**



**Tees
Fig. 829**

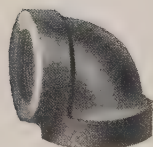
PRICE LIST

Size Inches	Elbows 45 and 90 Degrees		Tees Straight and Reducing	
	Faced Each	Faced, Drilled and Spotfaced Each	Faced Each	Faced, Drilled and Spotfaced Each
1½	\$29.00	\$32.50	\$35.00	\$40.00
2	31.50	35.00	37.50	42.50
2½	35.00	40.00	41.00	48.00
3	42.50	47.50	48.00	55.00
4	51.50	57.50	58.50	67.50
5	68.50	77.50	78.00	90.00
6	80.00	90.00	96.00	110.00

The bore of these fittings is made to suit XX strong pipe. See page 340.
For drilling template, see page 505.
For dimensions, see pages 502 and 503.
Tees will be furnished female all around unless otherwise specified and elbows, one end male and other end female.
Extra for labor attaching companion flanges and wooden protectors, see page 282.

HYDRAULIC BRONZE SCREWED ELBOWS AND TEES

3000 POUNDS WORKING PRESSURE — SHOCK



**Elbows
Fig. 823**



**Tees
Fig. 824**

PRICE LIST

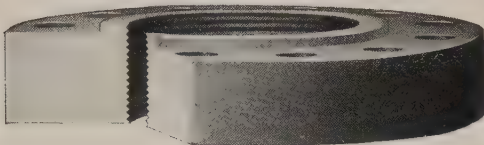
Size.....inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Elbows.....each	\$0.70	\$1.20	\$2.10	\$3.10	\$4.50	\$7.50	\$10.00	\$17.00
Tees.....each	1.00	1.65	3.00	4.30	6.00	10.75	14.00	23.00

For dimensions, see page 504.

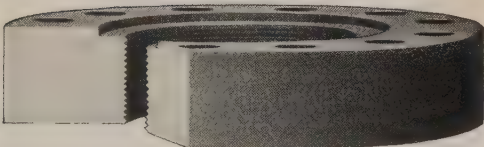
HYDRAULIC FLANGES—CAST STEEL

3000 POUNDS PITTSBURGH STANDARD

3000 POUNDS WORKING PRESSURE—SHOCK



Screwed Flange—Male
Fig. 833



Screwed Flange—Female
Fig. 834

PRICE LIST

Size.....inches	1½	2	2½	3	4	5	6
Faced.....each	\$7.75	\$8.25	\$8.75	\$9.75	\$11.50	\$13.75	\$17.50
Faced, Drilled and Spotfaced...each	8.50	9.00	10.00	11.00	13.00	16.00	20.00

If not ordered in pairs state whether male or female is wanted.

For drilling template, see page 505.

For dimensions, see page 505.

Extra for attaching wooden protectors, see page 282.

MACHINE BOLTS

PITTSBURGH HYDRAULIC STANDARD FOR 3000 POUNDS

MANUFACTURERS' STANDARD BOLTS

SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 505

PRICE LIST FOR ONE JOINT

Pipe Size In.	Number of Bolts	Size of Bolts For Flange and Flange Inches	One Set For Flange and Flange Each	Size of Bolts For Flange and Fitting Inches	One Set For Flange and Fitting Each	Size of Bolts For Fitting and Fitting Inches	One Set For Fitting and Fitting Each
$\frac{3}{4}$	4	$\frac{3}{4} \times 3\frac{3}{4}$	\$0.48	$\frac{3}{4} \times 3\frac{1}{2}$	\$0.46	$\frac{3}{4} \times 3$	\$0.43
1	4	$\frac{3}{4} \times 4\frac{1}{4}$	.51	$\frac{3}{4} \times 4$	.48	$\frac{3}{4} \times 3\frac{1}{2}$	.46
$1\frac{1}{4}$	4	$\frac{7}{8} \times 4\frac{3}{4}$	.71	$\frac{7}{8} \times 4\frac{1}{4}$	.68	$\frac{7}{8} \times 4$	.65
$1\frac{1}{2}$	4	$1 \times 5\frac{1}{4}$	1.03	$1 \times 4\frac{3}{4}$	.99	$1 \times 4\frac{1}{4}$	.95
2	4	$1\frac{1}{8} \times 6$	1.54	$1\frac{1}{8} \times 5\frac{1}{4}$	1.48	$1\frac{1}{8} \times 4\frac{3}{4}$	1.43
$2\frac{1}{2}$	8	$\frac{7}{8} \times 6\frac{1}{4}$	1.61	$\frac{7}{8} \times 5\frac{1}{2}$	1.49	$\frac{7}{8} \times 4\frac{3}{4}$	1.42
3	8	$1 \times 6\frac{1}{2}$	2.22	$1 \times 5\frac{3}{4}$	2.14	1×5	1.97
$3\frac{1}{2}$	8	$1\frac{1}{8} \times 6\frac{3}{4}$	3.29	$1\frac{1}{8} \times 6\frac{1}{4}$	3.18	$1\frac{1}{8} \times 5\frac{1}{2}$	2.96
4	8	$1\frac{1}{4} \times 7$	4.28	$1\frac{1}{4} \times 6\frac{1}{2}$	4.14	$1\frac{1}{4} \times 5\frac{3}{4}$	4.00
5	8	$1\frac{1}{2} \times 7\frac{1}{2}$	.....	$1\frac{1}{2} \times 7\frac{1}{4}$	.....	$1\frac{1}{2} \times 6\frac{3}{4}$	.....
6	8	$1\frac{3}{4} \times 8$	.....	$1\frac{3}{4} \times 7\frac{3}{4}$	.....	$1\frac{3}{4} \times 7\frac{1}{4}$	.....
8	12	$1\frac{3}{4} \times 8\frac{1}{2}$	.....	$1\frac{3}{4} \times 8\frac{1}{2}$	.....	$1\frac{3}{4} \times 7\frac{3}{4}$	.....

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

PITTSBURGH HYDRAULIC STANDARD FOR 3000 POUNDS

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Ring Gasket O. D.	Ring Gasket Each	Pipe Size Inches	Ring Gasket O. D.	Ring Gasket Each
$\frac{3}{4}$	$1\frac{3}{8}$	\$0.03	3	$3\frac{7}{8}$	\$0.16
1	$1\frac{5}{8}$	.04	$3\frac{1}{2}$	$4\frac{1}{2}$	.20
$1\frac{1}{4}$	2	.05	4	5	.24
$1\frac{1}{2}$	$2\frac{1}{4}$	.06	5	$6\frac{1}{8}$	.32
2	$2\frac{3}{4}$	.08	6	$7\frac{1}{4}$	.45
$2\frac{1}{2}$	$3\frac{1}{4}$	.12	...	...	...

MATERIAL FOR GAS LINES

Western Pennsylvania was the first district to make use of natural gas. Since the infancy of the industry we have been makers of valves and fittings for use in pipe lines transmitting this fuel, and we are familiar with the requirements of the various steps from the well, with its enormous rock pressure, to the low pressure street mains.

The following pages illustrate some of the standard goods we are prepared to furnish, either from stock or on short notice.

Many emergencies arise, which call for special treatment; and we are always pleased to figure to the drawings of our customers or to submit drawings to specifications.

Our product has come up to all requirements for years. There are valves made by us in service today which were installed when the first wells were piped.

WELL CONNECTIONS

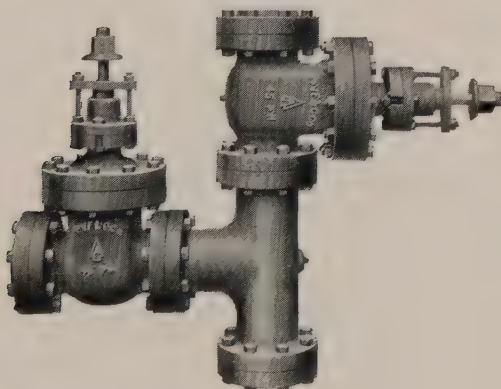
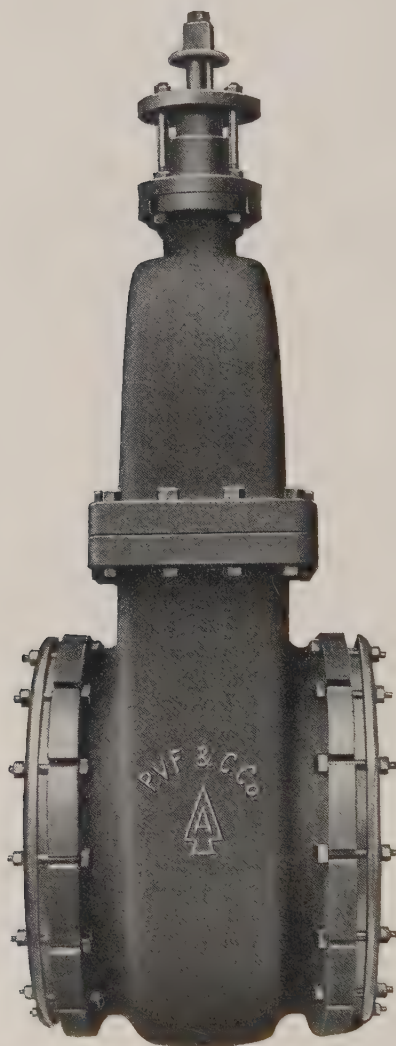


Fig. 4024

The illustration shown herewith is one of the forms of well connection used in the gas fields. As ordinarily supplied the connections are built for 1,000 pounds gas pressure; but where very great rock pressure is encountered we can supply these connections still heavier, and built especially for this service. All of these gate valves when open have the full nominal diameter, and an absolutely unimpeded passage through for tools.

GAS LINE GATE VALVE



Inside Screw Valve
Fig. 4023

We are prepared to furnish our gate valves with ends to suit any of the standard line couplings. Correspondence is solicited where special ends such as the one illustrated above are required.

REGULATING STATION

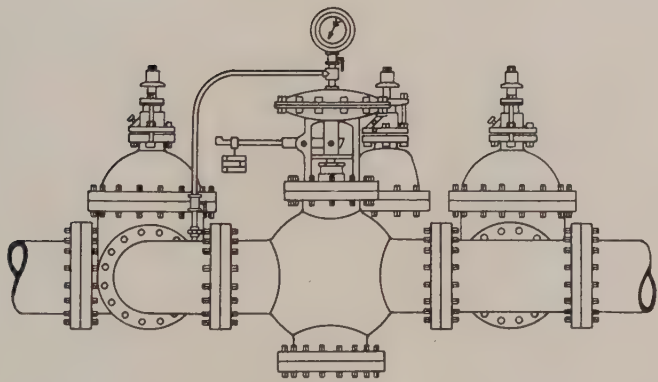
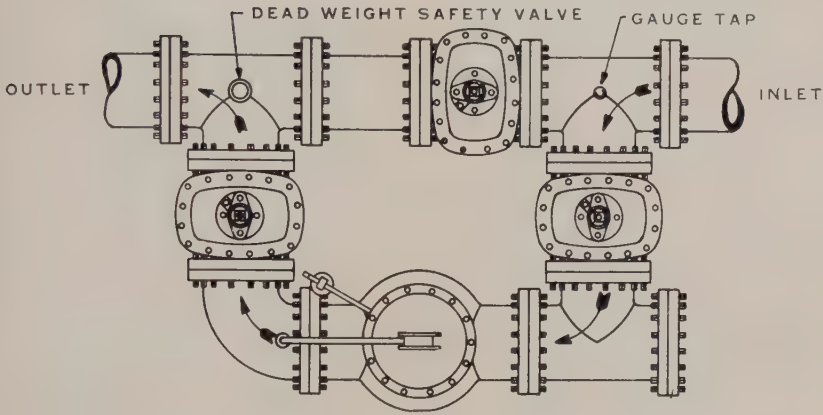
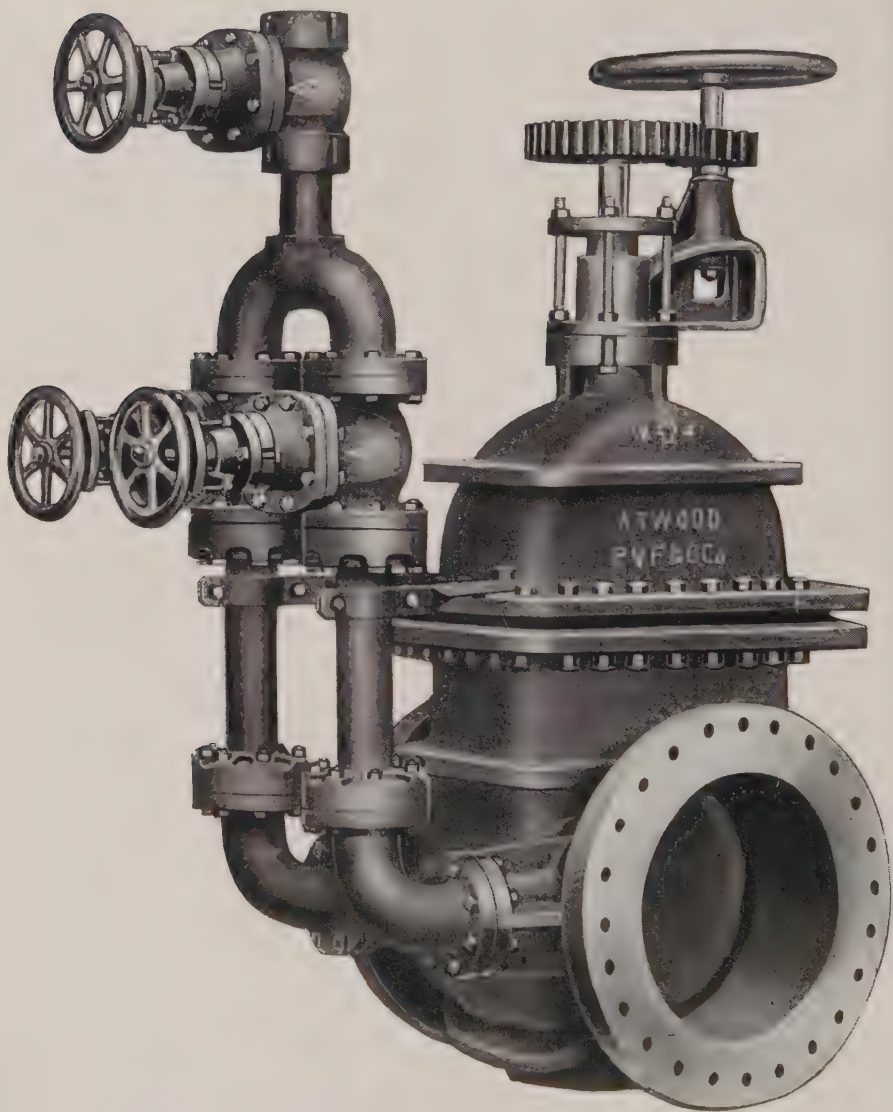
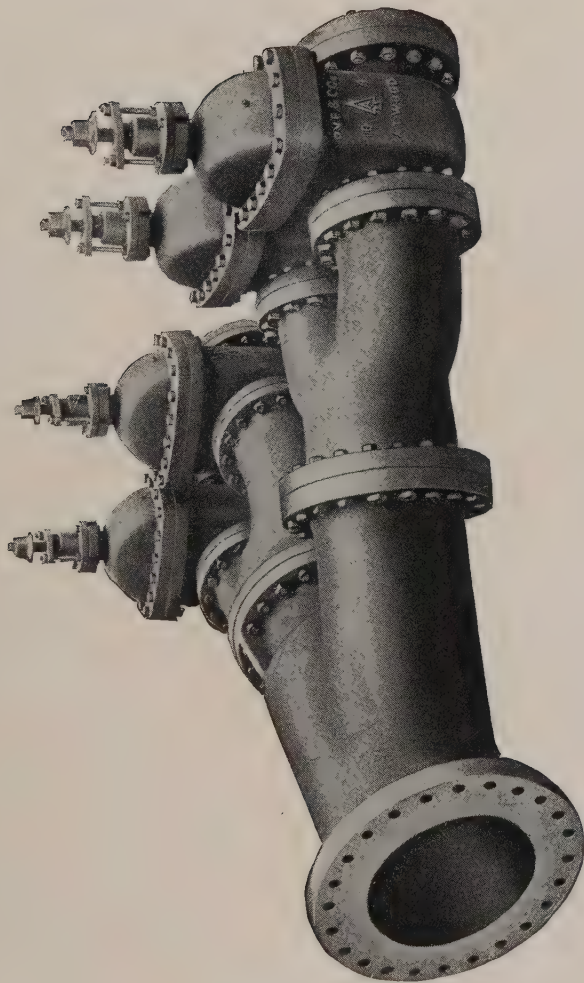


Fig. 4202

We have equipped many regulating stations in different parts of the country. The above cut shows a typical station with by-pass. Gate valves and fittings are of our gas line standard and regulators are made by the Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.



20-inch Gate Valve for 400 Pounds Gas
with Special Blow-off arrangement.



Division of 18-inch Line into Four 10-inch Lines for River Crossing

GAS LINE GATE VALVES
400 POUNDS WORKING PRESSURE
No. 4 P—REPACKING TYPE

We recommend this type of valve for natural gas at 400 pounds pressure. They have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them. Valves 3 inches and smaller have bronze discs. Valves larger than 3 inches have cast iron discs bronze mounted.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made all iron or with bronze, or special mountings.

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel when both are forced outward against their respective seats.

Valves 14 inches and above have the discs carried on bronze rollers. These rollers are placed on both edges of the discs so that the valves can be installed with either disc to the pressure.

When gearing is necessary our standard types of bevel and spur gears can be made to fit almost any condition. (See pages 532 to 536.) If special conditions exist these types can be varied to suit.

The stuffing-boxes of our inside screw gas line gate valves are equipped with a special "repacking" feature which has been found to be a great convenience as well as a gas saver, see fig. 4260.

Outside screw and yoke valves are backseated for repacking as shown in Fig. 206, page 50.

Unless otherwise ordered all valves are made to open by turning the wheel or nut to the left, viz., opposite the motion of the hands of a clock.

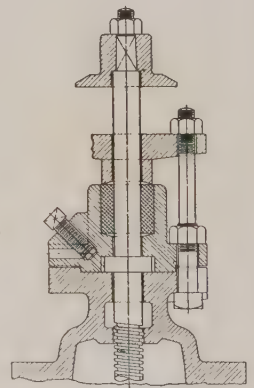


Fig. 4260

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

When so ordered standard valves will be equipped with by-passes. The by-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working pressure.

Whether screwed ends or flanged ends, and if screwed, number of threads per inch.

Whether all iron, or iron body bronze mounted.

Whether inside screw or outside screw and yoke.

Whether gearing is required; if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.

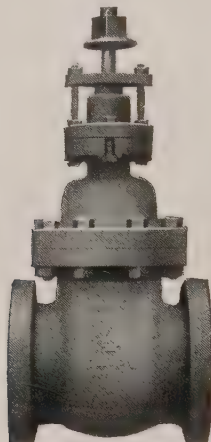
For price list, see page 314.

For drilling template, see page 513, with note.

For dimensions, see pages 508 and 509.



GAS LINE GATE VALVES No. 4 P
SEMI-STEEL. BRONZE MOUNTED. PARALLEL SEAT.
400 POUNDS WORKING GAS PRESSURE



The minimum opening through these valves is 100 per cent of the pipe area.

Inside Screw Valve
Fig. 4027

Furnished with square for wrench unless otherwise ordered
Flanged or Screwed

PRICE LIST No. 1

Size.....inches	2	3	4	6	8	10	12	16
Screwed or Flanged Ends..each	\$45.00	\$55.00	\$75.00	\$120.00	\$170.00	\$220.00	\$295.00	\$600.00

Price List No. 1 does not include companion flanges or drilling.

PRICE LIST No. 2

Size.....inches	2	3	4	6	8	10	12	16
Flanged Ends.. each	\$51.00	\$64.00	\$86.50	\$140.00	\$199.00	\$260.00	\$347.00	\$700.00

Price List No. 2 includes companion flanges bolted on, but does not include gaskets.

Valves 3 inches and smaller have bronze discs. Valves larger than 3 inches have cast iron discs bronze mounted.

Gas Line Gate Valves are fitted with bronze stems and repacking stuffing boxes.

Prices on all iron valves will be quoted on application.

For price list for companion flanges, see page 318.

Unless otherwise ordered, flanged valves will be furnished with companion flanges bolted on.

For bolt price list, see page 319.

For gasket price list, see page 320.

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 513, with note.

For dimensions, see pages 508 and 509.

For description, see page 312.

GAS LINE CHECK VALVES
SEMI-STEEL. BRONZE MOUNTED. SWING TYPE.
400 POUNDS WORKING GAS PRESSURE

The minimum opening through these valves is 100 per cent of the pipe area.

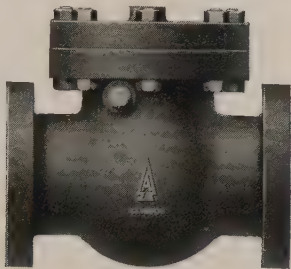


Fig. 4203

Flanged or Screwed

PRICE LIST No. 1

Size.....inches	2	3	4	6	8	10	12*
Screwed or Flanged Ends.....each	\$17.00	\$30.00	\$44.00	\$70.00	\$105.00	\$175.00	\$250.00

*12-inch size furnished flanged only.
Price List No. 1 does not include companion flanges or drilling.

PRICE LIST No. 2

Size.....inches	2	3	4	6	8	10	12
Flanged Ends.....each	\$23.00	\$39.00	\$55.50	\$90.00	\$134.00	\$215.00	\$302.00

Price List No. 2 includes companion flanges bolted on, but does not include gaskets.
These check valves are cast in semi-steel. Shaft is rolled bronze rod. Plugs are bronze.
Valves 3 inches and smaller are furnished with bronze discs.
Valves larger than 3 inches are furnished with semi-steel discs bronze mounted.
Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.
Valves will be furnished with companion flanges unless otherwise specified.
For drilling price list, see page 186.
For drilling template, see page 513, with note.
For dimensions, see page 510.
For price list for companion flanges, see page 318.
For bolt price list, see page 319.
For gasket price list, see page 320.

GAS LINE BOWL AND FLANGE PIECES

SEMI-STEEL

400 POUNDS WORKING GAS PRESSURE

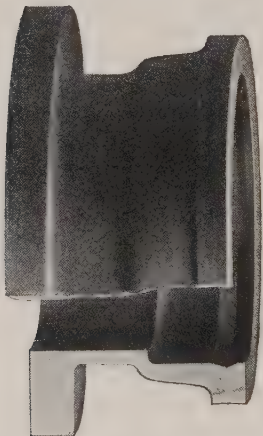


Fig. 4029

PRICE LIST

Size.... inches	4	5	6	8	10	12	14	16	20
Each.....	\$8.00	\$11.00	\$13.50	\$19.50	\$26.25	\$30.00	\$39.00	\$47.00	\$65.00

These fittings are made to connect with either wrought iron or cast iron pipe. In ordering specify the kind of pipe, and if cast iron specify the outside diameter of the pipe which enters the bowl.

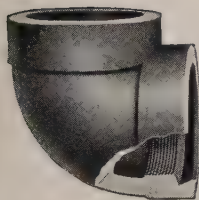
For drilling template, see page 513, with note.

For dimensions, see page 511.

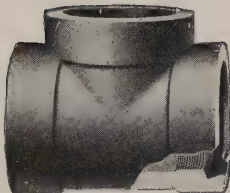
SEMI-STEEL SCREWED GAS LINE
FITTINGS

LEAD RECESSED

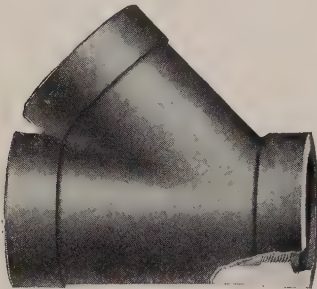
400 POUNDS WORKING GAS PRESSURE



90° Elbow
Fig. 4031



Tee
Fig. 4032



45° Y
Fig. 4033

PRICE LIST

Elbows		Tees		45 Degree Y's	
Size Inches	Each	Size Inches	Each	Size Inches	Each
2	\$ 1.60	2	\$ 2.40	2	Prices on Application
3	3.40	3	5.25	3	
4	5.50	4	8.80	4	
6	11.50	6	17.25	6	
8	19.50	8	29.25	8	
10	26.50	10	48.00	10	
12	40.00	12	74.00	12	

For dimensions, see page 512.

**LEAD RECESSED GAS LINE SCREWED
FLANGES**

SEMI-STEEL

400 POUNDS WORKING GAS PRESSURE



Fig. 4030

PRICE LIST

Size.....inches	2	3	4	6	8	10	12
Faced and Drilled.....each	\$2.30	\$2.75	\$3.70	\$7.25	\$10.50	\$13.50	\$16.50

Extra for male and female, spotfacing, and wooden protectors, see page 187.

For drilling template, see page 513, with note.

For dimensions, see page 513.

MACHINE BOLTS
GAS LINE STANDARD FOR 400 POUNDS

MANUFACTURERS' STANDARD BOLTS
SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 513

PRICE LIST FOR ONE JOINT

Pipe Size In- ches	Number of Bolts	Size of Bolts For Flange and Flange Inches	One Set For Flange and Flange Each	Size of Bolts For Flange and Fitting Inches	One Set For Flange and Fitting Each	Size of Bolts For Fitting and Fitting Inches	One Set For Fitting and Fitting Each
2	4	$\frac{5}{8}$ x 5	\$ 0.39	$\frac{5}{8}$ x $3\frac{3}{4}$	\$ 0.35	$\frac{5}{8}$ x $2\frac{1}{2}$	\$ 0.29
3	8	$\frac{5}{8}$ x $5\frac{1}{2}$	.80	$\frac{5}{8}$ x $4\frac{1}{4}$	.73	$\frac{5}{8}$ x 3	.62
4	8	$\frac{3}{4}$ x $5\frac{3}{4}$	1.17	$\frac{3}{4}$ x $4\frac{3}{4}$	1.07	$\frac{3}{4}$ x $3\frac{1}{2}$	.92
6	12	$\frac{3}{4}$ x $6\frac{1}{2}$	1.83	$\frac{3}{4}$ x $5\frac{1}{4}$	1.67	$\frac{3}{4}$ x $3\frac{3}{4}$	1.45
8	12	$\frac{7}{8}$ x $7\frac{1}{4}$	2.61	$\frac{7}{8}$ x $5\frac{3}{4}$	2.32	$\frac{7}{8}$ x $4\frac{1}{2}$	2.03
10	16	$\frac{7}{8}$ x $7\frac{3}{4}$	3.61	$\frac{7}{8}$ x $6\frac{1}{4}$	3.22	$\frac{7}{8}$ x $4\frac{3}{4}$	2.84
12	16	$\frac{7}{8}$ x $8\frac{1}{2}$	3.87	$\frac{7}{8}$ x $6\frac{3}{4}$	3.35	$\frac{7}{8}$ x $5\frac{1}{4}$	2.97
16	20	1 x $9\frac{1}{4}$	7.00	1 x $7\frac{1}{2}$	5.96	1 x $5\frac{3}{4}$	5.34
18	24	1 x $9\frac{1}{2}$	8.39	1 x $7\frac{3}{4}$	7.40	1 x 6	6.41
20	24	$1\frac{1}{8}$ x 10	11.84	$1\frac{1}{8}$ x $8\frac{1}{4}$	11.18	$1\frac{1}{8}$ x $6\frac{1}{2}$	9.53

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

GAS LINE STANDARD FOR 400 POUNDS

For drilling Template see page 513

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Ring Gasket O. D.	Ring Gasket Each	Full Gasket O. D.	Full Gasket Each
2	4 $\frac{3}{8}$	\$0.24	6 $\frac{1}{2}$	\$0.60
3	6	.43	8 $\frac{1}{4}$	.93
4	7 $\frac{1}{8}$	.58	10	1.32
5	8 $\frac{1}{2}$	.74	11	1.51
6	9 $\frac{7}{8}$	1.00	12 $\frac{1}{2}$	1.88
8	12 $\frac{1}{8}$	1.35	15	2.52
10	14 $\frac{3}{8}$	1.75	17 $\frac{1}{2}$	3.24
12	16 $\frac{7}{8}$	2.30	20	4.00
14	19 $\frac{1}{8}$	2.70	22 $\frac{1}{2}$	5.25
16	21 $\frac{1}{2}$	3.10	25	6.20
18	23 $\frac{1}{2}$	3.60	27	7.25
20	25 $\frac{5}{8}$	4.10	29 $\frac{1}{2}$	8.40

Ring gaskets cover the flange from inside of bolt to inside of pipe. All metallic gaskets are so furnished. Soft gaskets will be furnished "ring" unless specified "full."

GAS LINE GATE VALVES

1000 POUNDS WORKING PRESSURE

No. 5 P—REPACKING TYPE

We recommend this type of valve for natural gas at 1000 pounds pressure. They have parallel seats, and the discs in closing remove all foreign substances from the seats which would otherwise be crushed into them. Valves 3 inches and smaller have bronze discs. Valves larger than 3 inches have cast iron discs, bronze mounted.

They are made either outside screw and yoke or inside screw. The inside screw valve is of advantage where the stem needs protection, as in trenches or in exposed positions. The outside screw is desirable where the valve is not exposed to dirt or damage, and serves to show at a glance whether the valve is open or closed.

Our patterns are so arranged that valves can be made all iron or with bronze, or special mountings.

The wedging mechanism is very simple and effective. It is entirely independent of the stem and cannot operate until the discs reach the lower end of travel when both are forced outward against their respective seats.

When gearing is necessary our standard types of bevel and spur gears can be made to fit almost any condition. (See pages 532 to 536.) If special conditions exist these types can be varied to suit.

The stuffing boxes of our inside screw gas line gate valves are equipped with a special "repacking" feature which has been found to be a great convenience as well as a gas saver, see fig. 5025.

Outside screw and yoke valves are backseated for repacking as shown in Figure 206, page 50.

Unless otherwise ordered all valves are made to open by turning the wheel or nut to the left, viz., opposite the motion of the hands of a clock.

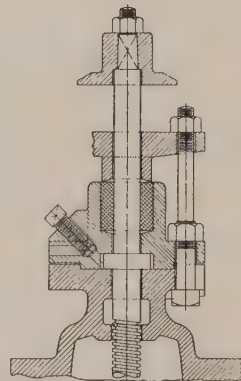


Fig. 5025

When so ordered standard valves will be equipped with by-passes. The by-pass valves are standard gate valves built to the same specification as the main valves.

When ordering please give the following information:

Size.

Working pressure.

Whether screwed or flanged ends, and if screwed give number of threads per inch.

Whether all iron or iron body, bronze mounted.

Whether inside screw or outside screw and yoke.

Whether gearing is required; if so, type—bevel or spur.

Whether by-pass is required.

Whether operated by nut or hand wheel.

For price list, see page 323.

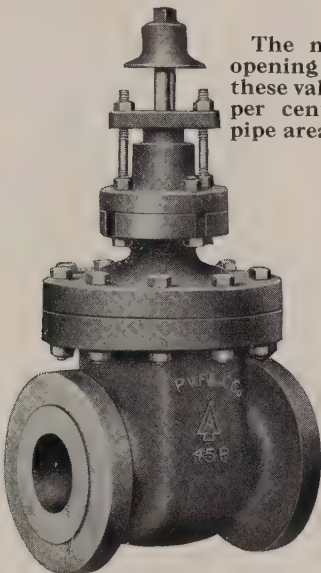
For drilling template, see page 517, with note.

For dimensions, see page 514.



ATWOOD

GAS LINE GATE VALVES No. 5 P
SEMI-STEEL. BRONZE MOUNTED. PARALLEL SEAT
1000 POUNDS WORKING GAS PRESSURE



The minimum opening through these valves is 100 per cent of the pipe area.

Inside Screw Valve
Fig. 505

Furnished with square for wrench unless otherwise ordered.

Flanged or Screwed
PRICE LIST No. 1

Size.....inches	2	3	4	6	8	10	12
Screwed or Flanged Ends.....each	\$55.00	\$80.00	\$100.00	\$160.00	\$235.00	\$340.00	\$500.00

Price List No. 1 does not include companion flanges or drilling.

PRICE LIST No. 2

Size.....inches	2	3	4	6	8	10	12
Flanged Ends.....each	\$63.50	\$92.50	\$115.00	\$188.00	\$274.00	\$395.00	\$570.00

Price List No. 2 includes companion flanges bolted on, but does not include gaskets.

The above gate valves are used for the high pressures at the wells and on the feeders in the gas fields.

Valves will be furnished with companion flanges unless otherwise ordered.

They are fitted with bronze stems and repacking stuffing-boxes.

Prices on all iron valves will be quoted on application.

Valves will be furnished with gate squares unless otherwise ordered.

For price list for companion flanges, see page 326.

For bolt price list, see page 327.

For gasket price list, see page 328.

Extra for spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 517, with note.

For dimensions, see page 514.

For description, see page 321.

Valves 3 inches and smaller have bronze discs. Valves larger than 3 inches have cast iron discs, bronze mounted.

GAS LINE CHECK VALVES

SEMI-STEEL. BRONZE MOUNTED. SWING TYPE.

1000 POUNDS WORKING GAS PRESSURE

The minimum opening through these valves is 100 per cent of the pipe area.

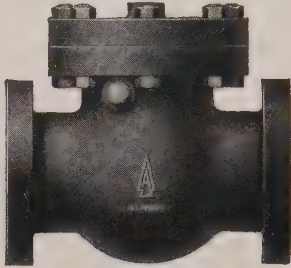


Fig. 5001

Flanged or Screwed

PRICE LIST No. 1

Size.....inches	2	3	4	6	8	10
Screwed or Flanged Ends...each	\$32.00	\$42.50	\$51.00	\$80.00	\$145.00	\$240.00

Price List No. 1 does not include companion flanges or drilling.

PRICE LIST No. 2

Size.....inches	2	3	4	6	8	10
Flanged Ends.....each	\$40.50	\$55.00	\$66.00	\$108.00	\$184.00	\$295.00

These check valves are cast in semi-steel. Shaft is rolled bronze rod. Plugs are bronze.

Valves 3 inches and smaller are furnished with bronze discs.

Valves larger than 3 inches are furnished with semi-steel discs, bronze mounted.

Valves will be furnished with companion flanges unless otherwise specified.

Extra for male and female, spotfacing, labor attaching companion flanges and wooden protectors, see page 188.

For drilling price list, see page 186.

For drilling template, see page 517, with note.

For dimensions, see page 515.

For price list for companion flanges, see page 326.

For bolt price list, see page 327.

For gasket price list, see page 328.

SEMI-STEEL SCREWED GAS LINE
FITTINGS

LEAD RECESSED

1000 POUNDS WORKING GAS PRESSURE



Tee
Fig. 509

45° Y
Fig. 510

90° Elbow
Fig. 508

PRICE LIST

Elbows		Tees		45 Degree Y's	
Size Inches	Each	Size Inches	Each	Size Inches	Each
2	\$ 1.80	2	\$ 2.60	2	Prices on Application
3	4.10	3	6.25	3	
4	7.00	4	10.75	4	
6	14.00	6	21.50	6	
8	25.50	8	38.50	8	
10	34.00	10	61.00	10	
12	51.00	12	85.00	12	

For dimensions, see page 516.

**LEAD RECESSED GAS LINE
SCREWED FLANGES**

SEMI-STEEL

1000 POUNDS WORKING GAS PRESSURE

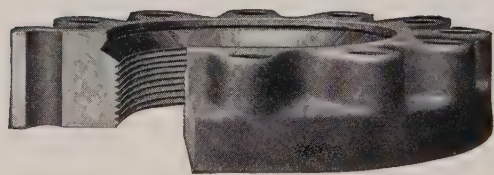


Fig. 507

PRICE LIST

Size.....inches	2	3	4	6	8	10	12
Faced and Drilled . . each	\$3 .25	\$3 .90	\$5 .00	\$10 .25	\$14 .75	\$19 .00	\$23 .00

Extra for spotfacing, and wooden protectors, see page 187.

For drilling template, see page 517, with note.

For dimensions, see page 517.

MACHINE BOLTS

GAS LINE STANDARD FOR 1000 POUNDS

MANUFACTURERS' STANDARD BOLTS SQUARE HEADS AND HEXAGONAL NUTS

For drilling template, see page 517

PRICE LIST FOR ONE JOINT

Pipe Size In.	Number of Bolts	Size of Bolts For Flange and Flange Inches	One Set For Flange and Flange Each	Size of Bolts For Flange and Fitting Inches	One Set For Flange and Fitting Each	Size of Bolts For Fitting and Fitting Inches	One Set For Fitting and Fitting Each
2	4	$\frac{3}{4} \times 5$	\$0.54	$\frac{3}{4} \times 4\frac{1}{4}$	\$0.51	$\frac{3}{4} \times 3\frac{1}{2}$	\$0.46
3	8	$\frac{3}{4} \times 5\frac{1}{2}$	1.12	$\frac{3}{4} \times 4\frac{3}{4}$	1.07	$\frac{3}{4} \times 4$	.96
4	8	$\frac{7}{8} \times 6$	1.55	$\frac{7}{8} \times 5\frac{1}{4}$	1.49	$\frac{7}{8} \times 4\frac{1}{4}$	1.36
6	12	$\frac{7}{8} \times 6\frac{3}{4}$	2.51	$\frac{7}{8} \times 5\frac{3}{4}$	2.32	$\frac{7}{8} \times 4\frac{3}{4}$	2.13
8	12	1 x $7\frac{1}{4}$	3.58	1 x $6\frac{1}{2}$	3.33	1 x $5\frac{3}{4}$	3.21
10	16	1 x $7\frac{3}{4}$	4.94	1 x 7	4.60	1 x $6\frac{1}{4}$	4.44
12	16	1 $\frac{1}{8}$ x $8\frac{3}{4}$	7.46	1 $\frac{1}{8}$ x $7\frac{3}{4}$	7.01	1 $\frac{1}{8}$ x $6\frac{3}{4}$	6.57

Unless otherwise specified, bolts will be furnished with manufacturers' square heads and United States Standard hexagonal nuts.

If manufacturers' hexagonal heads and United States hexagonal nuts are furnished add 10% to above list.

GASKETS

GAS LINE STANDARD FOR 1000 POUNDS

For Templates, see page 517

PRICE LIST FOR ONE JOINT

Pipe Size Inches	Size of Ring Gasket for Plain Face	Price of Ring Gasket for Plain Face Each	Size of Gasket for Male and Female	Price of Gasket for Male and Female Each
2	4 $\frac{1}{4}$ x 2	.30	3 $\frac{5}{8}$ x 2	.20
3	5 $\frac{7}{8}$ x 3	.60	5 x 3	.40
4	7 x 4	.60	6 x 4	.50
5	8 $\frac{3}{8}$ x 5	.90	7 $\frac{1}{4}$ x 5	.60
6	9 $\frac{3}{4}$ x 6	1.10	8 $\frac{3}{8}$ x 6	.90
8	12 x 8	1.50	10 $\frac{5}{8}$ x 8	1.00
10	14 $\frac{1}{4}$ x 10	1.90	12 $\frac{3}{4}$ x 10	1.30
12	16 $\frac{5}{8}$ x 12	2.50	15 $\frac{1}{4}$ x 12	1.95

“Ring” gaskets cover the face of flange from inside of bolt to inside of pipe.

GAS LINES SPECIALS

The material listed on the previous pages under the "The Gas Line Material Section" is our regular line of valves and fittings. We are prepared to furnish other miscellaneous material for this class of work as follows:

Pipe.....	SEE PAGES 338-341
Pipe Cutting.....	SEE PAGE 342
Pipe Bends of all descriptions.....	SEE PAGES 344-347
Swedged Reducers.....	SEE PAGE 220
General Welding.....	SEE PAGES 348-352
Welded Headers.....	SEE PAGES 350-351
Interlocked Welded Necks.....	SEE PAGES 348-351
Atwood Line Welds.....	SEE PAGE 349
Low Pressure Gate Valves.....	SEE PAGES 50-57
Flanged Fittings, etc.....	SEE PAGES { 73-77 100-108 and 166-174

MATERIAL FOR HYDRO-ELECTRIC SERVICE

The following pages illustrate some of the apparatus we have built for Hydro-Electric Service.

The conditions prevailing at Hydro-Electric plants are usually special and we are prepared to design and construct valves or fittings to meet customer's specification.

HYDRAULIC SPECIALTIES



58-Inch Hydraulic, Balanced Needle Valve
for Irrigation Service

HYDRAULIC SPECIALTIES



**59" x 60" Cylinder Operated Slide Valve
for Irrigation Service
Twelve of These Valves were Furnished for one Project**

HYDRAULIC SPECIALTIES



36-Inch Hydraulic, Balanced Needle Valve
for U. S. Government Irrigation Service





6'-6" x 6'-0" x 6'-0" Cast Steel Lateral. 240 Pounds Working Pressure, 500 Pounds Test Pressure.
Made for The Electric Bond & Share Company of New York City

GENERAL PIPING

CUTTING. THREADING. BENDING AND WELDING

We carry a large stock of wrought pipe of all weights and sizes and are equipped to fabricate same for any class of service.

Orders for commercial sizes of pipe should specifically state whether steel pipe or strictly wrought iron pipe is required.

Full standard weight pipes larger than 7 inches are made in several weights. Orders should state the weight wanted. See page 338.

The normal size of pipes 12 inches and smaller is the inside diameter. Pipes larger than 12 inches are known as O. D. (outside diameter) pipe, the nominal size of which is the outside diameter. Orders should clearly state the thickness required.

O. D. pipe cannot be threaded if thinner than $\frac{5}{16}$ inch.

Extra strong (X) and double extra strong (XX) pipe is always furnished with plain ends unless otherwise ordered.

Due to variation in length, designs for piping should not locate the flanges exactly unless such location is important for clearance or for other reasons. Dimensions should be from center to center of branch connections. See page 342.

PIPE BENDING

We are fully equipped with the most modern machinery for bending and finishing all sizes of pipe. These bends can be furnished in Full Weight, Extra Strong or Double Extra Strong pipe equipped with flanges as desired. (See pages 43, 44 and 45). We are in a position to make bends of any shape or dimensions. Pages 344 to 347 show some of the bends we have made. Page 520 shows a few of the standard types of regular bends. Pages 521 and 522 show the sizes of bends for full weight pipe.

Orders for bends should be accompanied with a sketch giving all the necessary dimensions. The thickness of pipe and type of flange should also be specified.

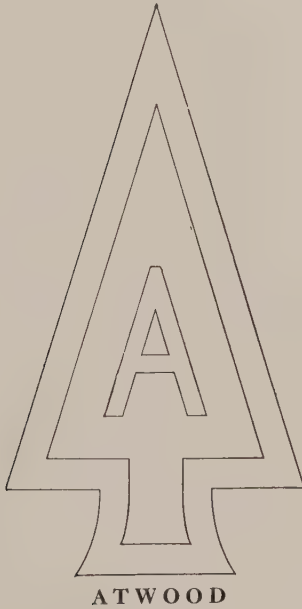
WELDED MATERIALS

The fabrication of pipe by means of welding has become an important part of the piping industry. Our policy for this work is to be satisfied with only the best and we have thus developed "The Interlock Welded Neck" and "Atwood Line Weld." Pages 348 and 349 illustrate these methods. We can justly claim that either "The Interlock Welded Neck" or "The Atwood Line Weld" is as strong as the pipe itself.

Welding of this type is largely dependent upon the personal element and for this reason we depend more upon the strength of the wrought material which is a known quantity, than we do upon the welding. Safety First requirements for high pressure welded steam lines demand this additional reinforcing over and above the simple butt weld.

The principal advantages of welded material are the reduction of the number of joints, erection and reduced weight.

Whether this construction is more or less expensive than cast fittings and flanges depends upon the sizes and location of branches. For prices, see pages 348 and 349.



STANDARD STEAM, GAS AND WATER PIPE

FULL STANDARD WEIGHT. BLACK AND GALVANIZED
ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

PRICE LIST

Size Inches	List Price Per Foot	Diameters		Thickness	Weight per Foot		Threads per Inch
		External	Internal		Plain Ends	Threads and Couplings	
$\frac{1}{8}$	\$0.05½	.405	.269	.068	.244	.245	27
$\frac{1}{4}$	.06	.540	.364	.088	.424	.425	18
$\frac{3}{8}$	.06	.675	.493	.091	.567	.568	18
$\frac{1}{2}$	.08½	.840	.622	.109	.850	.852	14
$\frac{3}{4}$	.11½	1.050	.824	.113	1.130	1.134	14
1	.17	1.315	1.049	.133	1.678	1.684	11½
1¼	.23	1.660	1.380	.140	2.272	2.281	11½
1½	.27½	1.900	1.610	.145	2.717	2.731	11½
2	.37	2.375	2.067	.154	3.652	3.678	11½
2½	.58½	2.875	2.469	.203	5.793	5.819	8
3	.76½	3.500	3.068	.216	7.575	7.616	8
3½	.92	4.000	3.548	.226	9.109	9.202	8
4	1.09	4.500	4.026	.237	10.790	10.889	8
4½	1.27	5.000	4.506	.247	12.538	12.642	8
5	1.48	5.563	5.047	.258	14.617	14.810	8
6	1.92	6.625	6.065	.280	18.974	19.185	8
7	2.38	7.625	7.023	.301	23.544	23.769	8
8	2.50	8.625	8.071	.277	24.696	25.000	8
8	2.88	8.625	7.981	.322	28.554	28.809	8
9	3.45	9.625	8.941	.342	33.907	34.188	8
10	3.20	10.750	10.192	.279	31.201	32.000	8
10	3.50	10.750	10.136	.307	34.240	35.000	8
10	4.12	10.750	10.020	.365	40.483	41.132	8
11	4.63	11.750	11.000	.375	45.557	46.247	8
12	4.50	12.750	12.090	.330	43.773	45.000	8
12	5.07	12.750	12.000	.375	49.562	50.706	8

The permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with threads and couplings and in random lengths unless otherwise ordered.
All weights given in pounds. All dimensions given in inches.

For cut lengths, an extra charge will be made above random lengths.

For pipe smoothed on the inside, known as reamed and drifted, an extra charge will be made above standard pipe.

For Galvanized or Coated pipe, an extra charge will be made above Black.

EXTRA STRONG STEAM, GAS AND WATER PIPE

EXTRA STRONG PIPE. BLACK AND GALVANIZED

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

PRICE LIST

Size Inches	List Price per Foot	Diameters		Thickness	Weight per Foot Plain Ends
		External	Internal		
$\frac{1}{8}$	\$0.12	.405	.215	.095	.314
$\frac{1}{4}$	.07 $\frac{1}{2}$	.540	.302	.119	.535
$\frac{3}{8}$	.07 $\frac{1}{2}$	.675	.423	.126	.738
$\frac{1}{2}$	.11	.840	.546	.147	1.087
$\frac{3}{4}$	.15	1.050	.742	.154	1.473
1	.22	1.315	.957	.179	2.171
1 $\frac{1}{4}$	.30	1.660	1.278	.191	2.996
1 $\frac{1}{2}$	.36 $\frac{1}{2}$	1.900	1.500	.200	3.631
2	.50 $\frac{1}{2}$	2.375	1.939	.218	5.022
2 $\frac{1}{2}$	.77	2.875	2.323	.276	7.661
3	1.03	3.500	2.900	.300	10.252
3 $\frac{1}{2}$	1.25	4.000	3.364	.318	12.505
4	1.50	4.500	3.826	.337	14.983
4 $\frac{1}{2}$	1.80	5.000	4.290	.355	17.611
5	2.08	5.563	4.813	.375	20.778
6	2.86	6.625	5.761	.432	28.573
7	3.81	7.625	6.625	.500	38.048
8	4.34	8.625	7.625	.500	43.388
9	4.90	9.625	8.625	.500	48.728
10	5.48	10.750	9.750	.500	54.735
11	6.10	11.750	10.750	.500	60.075
12	6.55	12.750	11.750	.500	65.415

The permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with plain ends and in random lengths, unless otherwise ordered.

All weights given in pounds. All dimensions given in inches.

Random length of Extra Strong and Double Extra Strong pipe is considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths from 6 feet to 12 feet.

For pipe fitted with threads and couplings, an extra charge will be made above plain ends.

For cut lengths, an extra charge will be made above random.

For Galvanized or Coated pipe, an extra charge will be made above Black.

DOUBLE EXTRA STRONG STEAM, GAS AND WATER PIPE

DOUBLE EXTRA STRONG PIPE—BLACK AND GALVANIZED
ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

PRICE LIST

Size Inches	List Price per Foot	Diameters		Thickness	Weight per Foot Plain Ends
		External	Internal		
$\frac{1}{2}$	\$0.32	.840	.252	.294	1.714
$\frac{3}{4}$	.35	1.050	.434	.308	2.440
1	.37	1.315	.599	.358	3.659
$1\frac{1}{4}$	.52 $\frac{1}{2}$	1.660	.896	.382	5.214
$1\frac{1}{2}$	.65	1.900	1.100	.400	6.408
2	.91	2.375	1.503	.436	9.029
$2\frac{1}{2}$	1.37	2.875	1.771	.552	13.695
3	1.86	3.500	2.300	.600	18.583
$3\frac{1}{2}$	2.30	4.000	2.728	.636	22.850
4	2.76	4.500	3.152	.674	27.541
$4\frac{1}{2}$	3.26	5.000	3.580	.710	32.530
5	3.86	5.563	4.063	.750	38.552
6	5.32	6.625	4.897	.864	53.160
7	6.35	7.625	5.875	.875	63.079
8	7.25	8.625	6.875	.875	72.424

The permissible variation in weight is 10 per cent above and 10 per cent below.

Furnished with plain ends and in random lengths unless otherwise ordered.

All weights given in pounds. All dimensions given in inches.

Random length of Extra Strong and Double Extra Strong pipe is considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths from 6 feet to 12 feet.

For pipe fitted with threads and couplings, an extra charge will be made above plain ends.

For cut lengths, an extra charge will be made above random lengths.

For Galvanized or Coated pipe, an extra charge will be made above Black.

HYDRAULIC SIZES 9-inch, 10-inch, 11-inch and 12-inch

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

PRICE LIST

Size Inches		Thickness							
		Fraction $\frac{5}{8}$ "		$\frac{3}{4}$ "		$\frac{7}{8}$ "		1"	
		Decimal .625		.75		.875		1.00	
Nominal	O. D.	Weight	List	Weight	List	Weight	List	Weight	List
9	$9\frac{5}{8}$	60.08	\$6.01	71.09	\$7.11	81.77	\$ 8.18	92.12	\$ 9.22
10	$10\frac{3}{4}$	67.59	6.76	80.10	8.01	92.28	9.23	104.13	10.42
11	$11\frac{3}{4}$	74.26	7.43	88.11	8.82	101.63	10.17	114.81	11.49
12	$12\frac{3}{4}$	80.94	8.10	96.12	9.62	110.97	11.10	125.49	12.55

Permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with plain ends and in random lengths, unless otherwise ordered.

All weights given in pounds. All dimensions given in inches.

LARGE O. D. PIPE—Plain Ends

PRICE LIST PER FOOT

Size O. D. Inches	1/4-Inch Thick			3/8-Inch Thick			1/2-Inch Thick			3/4-Inch Thick			1-Inch Thick			1 1/4-Inch Thick		
	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick
14	36.713	\$3.68		45.682	\$4.57		54.568	\$5.46		63.371	\$6.34		72.091	\$7.21		80.726	\$8.08	
15	39.383	3.94		49.020	4.91		58.573	5.86		68.044	6.81		77.431	7.75		86.734	8.68	
16	42.053	4.21		52.357	5.24		62.579	6.26		72.716	7.28		82.771	8.28		92.742	9.28	
17	44.723	4.48		55.695	5.57		66.584	6.66		77.389	7.74		88.111	8.82		98.749	9.88	
18	47.393	4.74		59.032	5.91		70.589	7.06		82.061	8.21		93.451	9.35		104.757	10.48	
20	.....	.....		65.708	6.58		78.599	7.86		91.407	9.15		104.131	10.42		116.772	11.68	
21	.....	.....		69.045	6.91		82.604	8.27		96.079	9.61		109.471	10.95		122.780	12.28	
22	.....	.....		72.383	7.24		86.609	8.67		100.752	10.08		114.811	11.49		128.787	12.88	
24	.....	.....		.....	.....		94.619	9.47		110.097	11.01		125.491	12.55		140.802	14.09	
26	.....	.....		.....	.....		102.629	10.27		119.442	11.95		136.172	13.62		152.818	15.29	
28	.....	.....		.....	.....		.....	.....		128.787	12.88		146.852	14.69		164.833	16.49	
30	.....	.....		.....	.....		.....	.....		138.132	13.82		157.532	15.76		176.848	17.69	

Size O. D. Inches	3/8-Inch Thick			1/2-Inch Thick			3/4-Inch Thick			1-Inch Thick			1 1/4-Inch Thick		
	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick	Weight Per Foot	Per Foot	Thick
14	89.279	\$8.93		97.748	\$9.78		106.134	\$10.62		122.654	\$12.27		138.842	\$13.89	
15	95.954	9.60		105.091	10.51		114.144	11.42		132.000	13.20		149.522	14.96	
16	102.629	10.27		112.433	11.25		122.154	12.22		141.345	14.14		160.202	16.03	
17	109.304	10.94		119.776	11.98		130.164	13.02		150.690	15.07		170.882	17.09	
18	115.979	11.60		127.118	12.72		138.174	13.82		160.035	16.01		181.562	18.16	
20	129.330	12.94		141.804	14.19		154.194	15.42		178.725	17.88		202.923	20.30	
21	136.005	13.61		149.146	14.92		162.204	16.23		.....	.....		.....	.....
22	142.680	14.27		156.489	15.65		170.215	17.03		.....	.....		.....	.....
24	156.030	15.61		171.174	17.12		186.235	18.63		.....	.....		.....	.....
26	169.380	16.94		185.859	18.59		202.255	20.23		.....	.....		.....	.....
28	182.730	18.28		200.545	20.06		218.275	21.83		.....	.....		.....	.....
30	196.081	19.61		215.230	21.53		234.296	23.43		.....	.....		.....	.....

This pipe will be shipped in random lengths, plain ends, unless otherwise ordered.
 For cut lengths, an extra charge above random will be made.
 For threaded pipe, an extra charge above plain end will be made.
 We can thread and couple up to 20 inches.

PIPE CUTTING

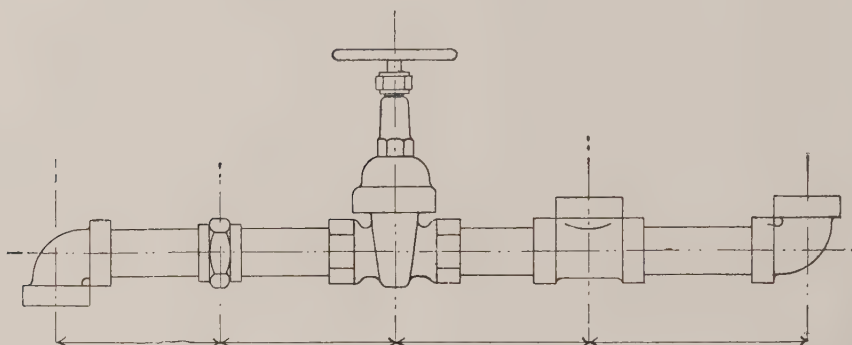


Fig. 80

We are equipped with the most improved facilities for cutting, threading and fitting all sizes of pipe to sketch.

In laying out work of this kind great care should be taken in making sketches. All measurements should be given center to center as shown in above diagram. It is also necessary to know for what purpose the pipe is to be used and the pressure it is required to stand.

PRICE LISTS

Standard Threads for Wrought Iron Pipe

Size...inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Each . . . . .	.05	.05	.05	.05	.05	.06	.07	.08	.10	.15	.20	.25	.35	.45
Size...inches	5	6	7	8	9	10	12	14	15	16	18	20	22	24
Each . . . . .	.55	.70	.85	1.00	1.25	1.50	2.50	3.50	3.50	5.00	8.00	10.00	12.50	15.00

Making Pipe Bends

Size...inches	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	7	8	10
90° or less ea.	10.00	12.50	15.00	17.50	20.00	22.50	25.00	30.00	35.00	40.00	50.00
Offsets . . ea.	15.00	18.75	22.50	26.75	30.00	33.75	37.50	45.00	52.50	60.00	75.00
U-Bends. ea.	20.00	25.00	30.00	35.00	40.00	45.00	50.00	60.00	70.00	80.00	100.00
Size...inches	12	14	15	16	18	20	22	24	26	28	30
90° or less ea.	60.00	84.00	90.00	96.00	108.00	150.00	165.00	180.00	195.00	210.00	225.00
Offsets . . ea.	90.00	126.00	135.00	144.00	162.00	225.00	247.50	270.00	292.50	315.00	337.50
U-Bends. ea.	120.00	168.00	180.00	192.00	216.00	300.00	330.00	360.00	390.00	420.00	450.00

Prices do not include pipe or flanges.

Special prices for bends with welded or Atwood flanges.

CUTTING PIPE
PLAIN ENDS

PRICE LIST

Size Inches	Price per Cut	Size Inches	Price per Cut
1/2	\$0.25	7	\$1.00
3/4	.25	8	1.00
1	.25	9	1.50
1 1/4	.25	10	1.50
1 1/2	.30	12	2.00
2	.30	14	4.00
2 1/2	.35	15	4.50
3	.50	16	5.00
3 1/2	.50	18	6.00
4	.50	20	7.50
4 1/2	.50	24	9.00
5	.60	28	11.00
6	.75	30	12.50

ATTACHING SCREWED FITTINGS

PRICE LIST

FOR PRESSURES TO AND INCLUDING 250 POUNDS

Size.....inches	1" and smaller	1 1/4	1 1/2	2	2 1/2	3	4	5	6	7	8	10	12
Each . per end.	\$0.08	...	\$.12	\$.16	\$.20	\$.25	\$.35	\$.40	\$.50	\$.55	\$.65	\$.80	\$.95

PRICE LIST

For Pressures From 300 Pounds to and Including 1000 Pounds

Size.....inches	1" and smaller	1 1/4	1 1/2	2	2 1/2	3	4	5	6	7	8	10	12
Each . per end.	\$ 0.35	...	\$ 0.50	\$ 0.65	\$ 0.80	\$ 1.00	\$ 1.40	\$ 1.60	\$ 2.00	\$ 2.20	\$ 2.60	\$ 3.20	\$ 3.80

Above prices are for one end only.



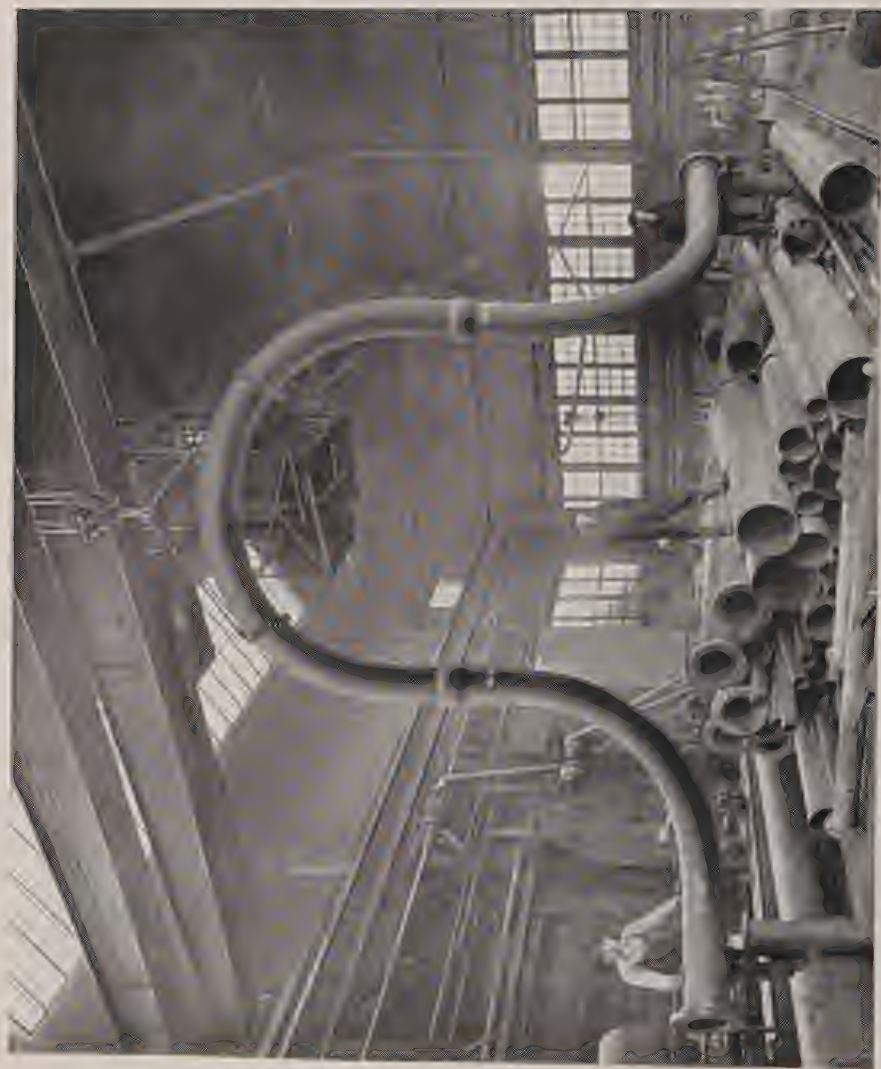
Main Section of 18" Expansion Loop Furnished for South Meadow Power Station of Hartford Electric Light Company
This Bend Required a Special "Well" Car for Shipment



**Expansion Loop for Main Steam Header
Colfax Power Station, Duquesne Light Company
Dwight P. Robinson Co., Engineers**

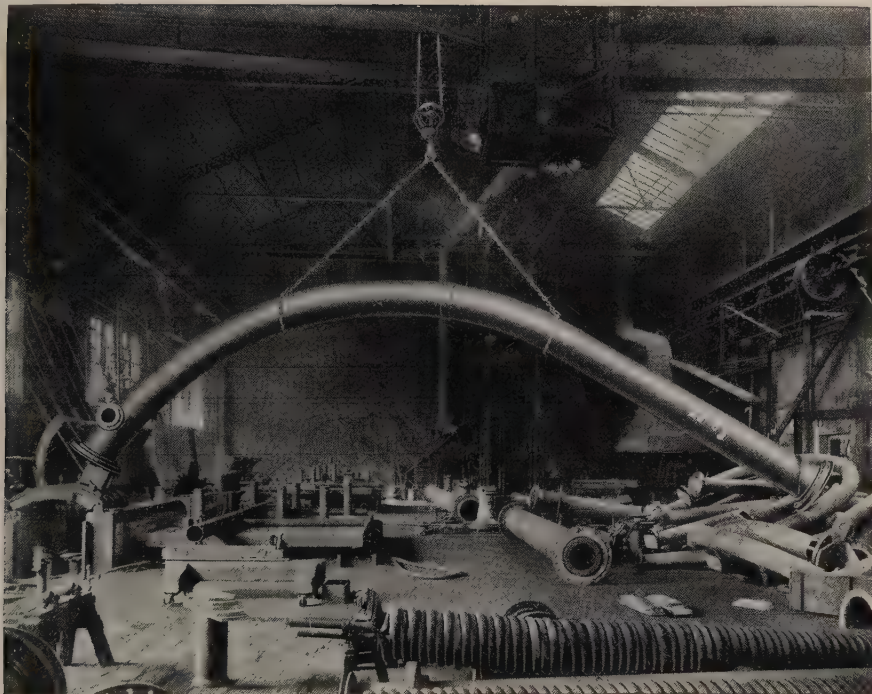
This bend contains 92 feet of 18" pipe.

Each section was made up of one or more pieces of pipe connected by the Atwood Line Weld. See page 349 for Atwood Line Weld.



This Pipe Bend Contains 53 Feet of 14-inch Pipe

The three lengths were connected by the Atwood Line Weld. On account of its size, it could not be shipped by rail. A river barge was used to deliver it to the Allegheney Plant of the Jones & Laughlin Steel Co.



20-inch Expansion Bend, Radius 16 Feet

Made of two lengths of steel pipe joined before bending by the "Atwood Line Weld." The 8-inch branch at the left is attached by the "Interlock Method"

“INTERLOCK” WELDED NECKS



The “Interlock” Welded Neck—“As Strong as the Pipe”
Fig. 9036

PRICE LIST

Welding Necks to Pipe by Interlock Method. Exclusive of Pipe and Flange. Based on Neck Being at Least Two Sizes Smaller than Pipe to which it is Attached

Size of Neck.....inches	4	5	6	7	8	9	10
Each.....	\$ 81.00	\$ 86.00	\$ 93.00	\$ 103.00	\$ 115.00	\$ 125.00	\$ 135.00
Size.....inches	12	14	15	16	18	20	....
Each.....	\$ 155.00	\$ 180.00	\$ 205.00	\$ 230.00	\$ 260.00	\$ 300.00	....

For necks one size smaller than pipe, add 10 per cent to list prices.

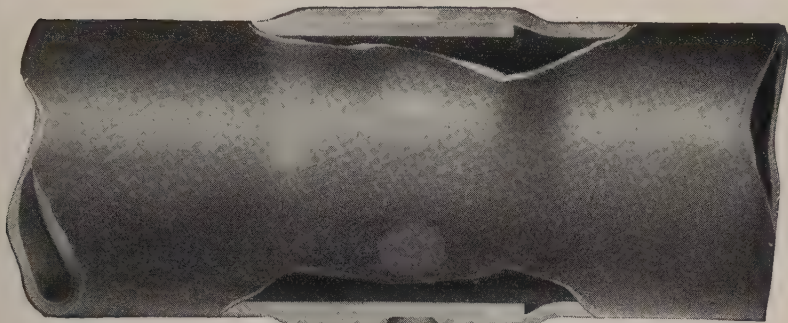
For necks of same size as pipe, add 20% to list prices

In addition to the extras add 15% when necks are attached to bends.

Center to face is the same as that of a tee of corresponding size and pressure.

For description, see page 336.

ATWOOD LINE WELDS



Atwood Line Weld
Fig. 9037

PRICE LIST

MAKING ATWOOD LINE WELDS EXCLUSIVE OF PIPE

Size of Pipe.....inches	2½	3	3½	4	5	6	7	8	9	10
Each	\$42.00	\$49.50	\$57.00	\$64.00	\$66.00	\$69.00	\$73.00	\$76.00	\$81.00	\$85.00

Size of pipe.....inches	12	14	15	16	18	20	24	26	30	
Each	\$ 95.00	\$110.00	\$120.00	\$130.00	\$150.00	\$170.00	\$195.00	\$210.00	\$250.00	

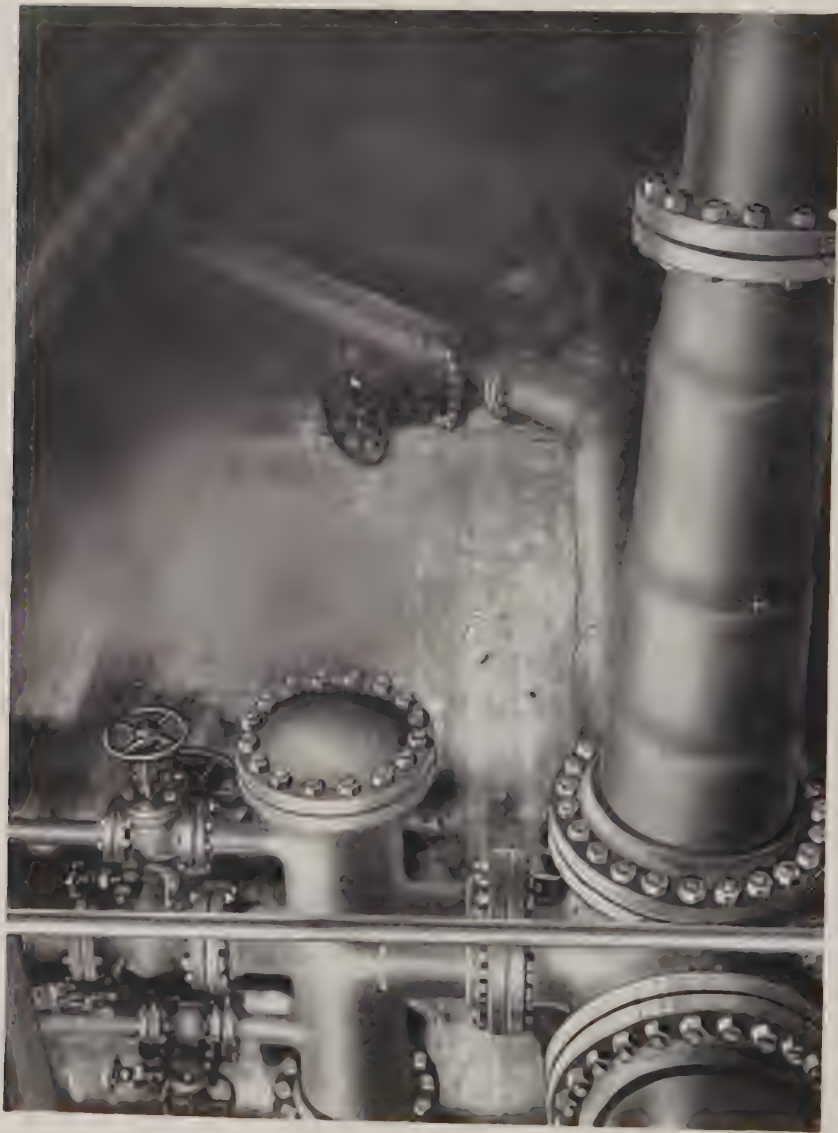
For description, see page 336.
When figuring pipe, add 6 inches for telescoping per weld.

WELDING PADS
TO PIPE

PRICE LIST

Size.....inches	1" and smaller	1¼	1½	2	2½	3
Each	\$17.50	\$20.00	\$20.00	\$25.00	\$32.50	\$37.50

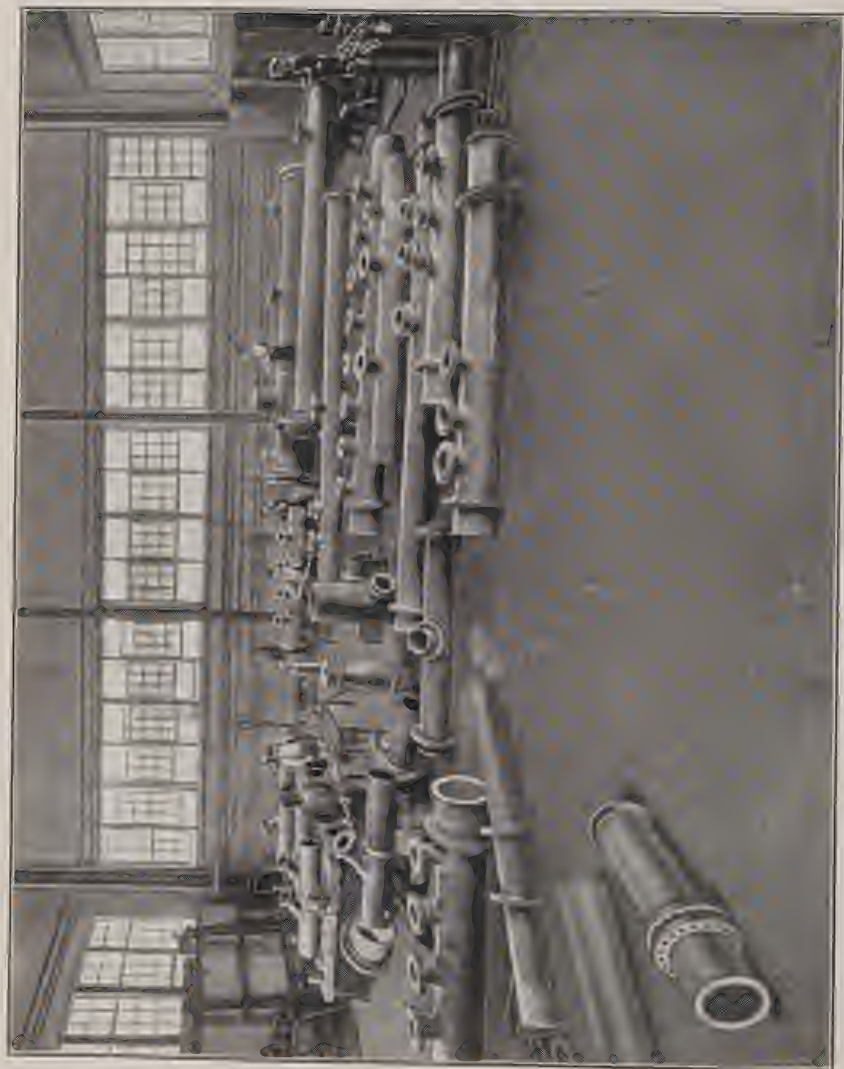
Above prices include tapping as per size listed.



View Showing Welded Header and Swedge Piping which we Furnished for
One of the Deere Factories



Welded Header. All Necks Attached by Our "Arwood Interlock Method"



Welding Shop

PIPE HANGERS

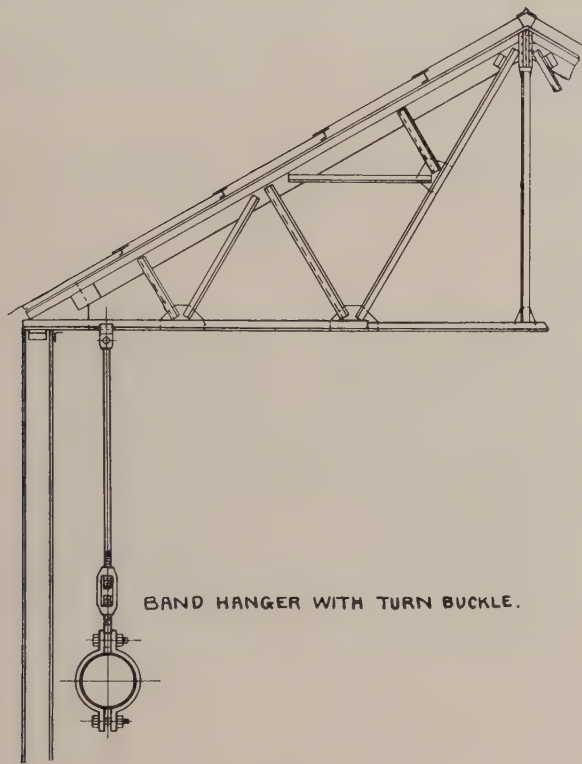


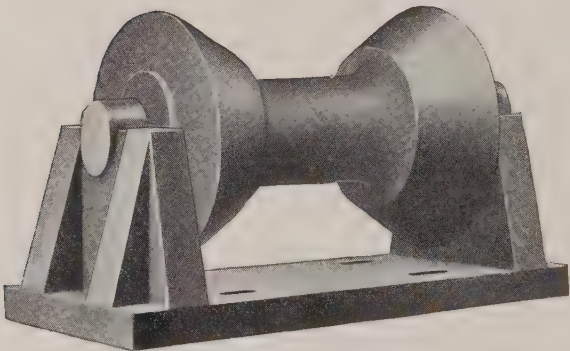
Fig. 9038

PRICE LIST

Size Inches	Each	Size Inches	Each	Size Inches	Each
4	\$22 .00	12	\$43 .50	22	\$70 .00
5	25 .00	14	49 .00	24	75 .00
6	28 .00	15	52 .00	..	.....
7	30 .00	16	54 .00	..	.....
8	33 .00	18	60 .00	..	.....
10	38 .00	20	65 .00	..	.....

The above prices are based on not over 6 feet long.
Special supports, prices on application, see pages 538 to 545.

PLAIN ROLLER SUPPORTS



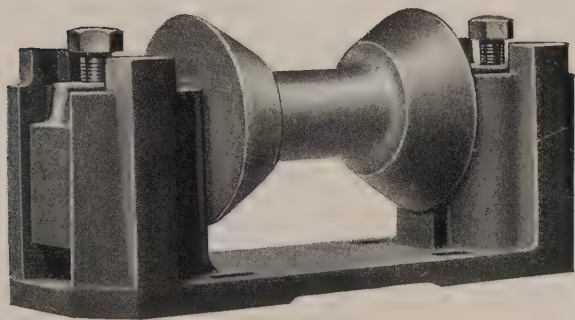
Plain Roller Support
Fig. 911

PRICE LIST

Pipe Size.....inches	1½-2½ Inclusive	3-8 Inclusive	9-12 Inclusive	14-16 Inclusive	18-24 Inclusive	26-30 Inclusive
Price.....each	\$3.00	\$5.00	\$9.50	\$16.00	\$20.00	\$31.00

For dimensions, see page 538.

ADJUSTABLE ROLLER SUPPORTS



Adjustable Roller Support
Fig. 912

PRICE LIST

Pipe Size.....inches	3-8 Inclusive	9-12 Inclusive	14-16 Inclusive	18-24 Inclusive
Each.....	\$10 .00	\$20 .00	\$25 .00	\$30 .00

For dimensions, see page 539.

STANCHION SADDLES

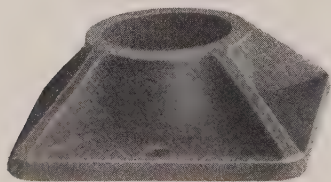


Stanchion Saddle
Fig. 913

PRICE LIST

Size of Pipe to be Supported.....inches	4	4½	5	6	7	8	9	10
Each.....	\$5.50	\$5.50	\$5.50	\$7.00	\$7.00	\$7.50	\$9.00	\$9.00

Size of Pipe to be Supported.....inches	12	14	15	16	18	20	22	24	30
Each.....	\$10.00	\$13.50	\$15.00	\$17.00	\$19.00	\$25.50	\$25.50	\$26.00	\$40.00

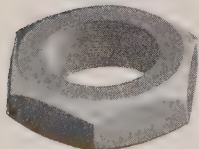


Stanchion Base
Fig. 914

STANCHION BASES

PRICE LIST

Size of Stanchion.....inches	2	2½	3	4	5	6
Each.....	\$2.50	\$4.00	\$6.00	\$8.00	\$12.00	\$16.00



Stanchion Lock Nut
Fig. 915

STANCHION LOCK NUTS

PRICE LIST

Size.....inches	2	2½	3	4	5	6
Each.....	\$0.90	\$1.10	\$1.50	\$2.30	\$3.50	\$4.00

For dimensions, see page 540.

CROSS ARCH GEARING

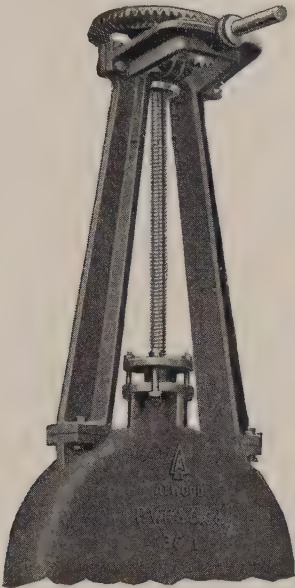


Fig. 9035

The following prices are to be added to price of regular spur or bevel gears, shown on pages 56, 85 and 86.

PRICE LISTS

Inside Screw

Size . . inches	16	18	20	22	24	26	28	30	32	34	36	42	48
No. 1 P. each	No cross arch required. Stuffing box with gear shaft may be turned 90°						\$15.00	\$15.00	\$15.00	\$17.50	\$17.50	\$22.50	\$25.00
No. 2 P. each	.....	\$15.00	\$15.00	\$15.00	\$15.00	\$17.50	17.50	20.00	....	.....	.....	..	..

Outside Screw and Yoke

Size . . inches	16	18	20	22	24	26	28	30	32	34	36	42	48
No. 1 P. each	\$55.00	\$55.00	\$55.00	\$58.00	\$58.00	\$58.00	\$62.00	\$62.00	\$62.00	\$65.00	\$65.00	\$79.00	\$85.00
No. 2 P. each	58.00	62.00	62.00	62.00	62.00	65.00	65.00	72.00	...	..	..	..	....

No. 1 P, low pressure gate valve.
No. 2 P, standard gate valve.
See page 54.

FLOOR STANDS, INDICATORS AND EXTENSION STEMS

FLOOR STANDS—See page 531

PRICE LISTS

Size Number.....	1	2	3
Plain, unfinished floor stand only.....each	\$30.00	\$35.00	\$20.00
Extra for Indicator.....each	60.00	60.00	60.00

No. 3 floor stand cannot be used with stems larger than 1½ inch.

EXTENSION STEM COUPLINGS

Stem diameter, inches	1" and Smaller	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3
Inside Screw...each See page 534.	\$ 4.00	\$ 5.00	\$ 6.00	\$ 7.00	\$ 8.00	\$ 9.00	\$10.00	\$12.50	\$17.00	\$22.00
Outside Screw...each See page 535.	12.00	16.50	17.50	20.50	23.00	27.00	31.25	38.00	47.50	57.00

COLD ROLLED STEEL EXTENSION STEMS

Diameter of Stem.....inches	1" and Smaller	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3
*Stem above floor...each	\$10.25	\$11.00	\$12.00	\$13.75	\$16.00	\$18.25	\$21.00	\$25.00	\$30.00	\$40.00
Additional stem per foot	.75	.95	1.15	1.60	2.15	2.75	3.50	4.25	5.00	6.00

*This price includes the stem from the hand wheel to the base of the floor stand.

For diameter of stem see the following:

Low Pressure Gate Valves, page 362.

125 pound Gate Valves, page 384.

Medium Gate Valves, Parallel Seat, page 410.

Medium Gate Valves, Taper Seat, page 411.

Extra Heavy Gate Valves, Semi-Steel, page 413.

Extra Heavy Gate Valves, Cast Steel, page 453.

For typical arrangement of inside screw extension, floor stand, etc., see page 535 and for outside screw and yoke see page 536.

Stems longer than 20 feet require an extra coupling which in all cases will be an inside screw coupling.

Prices do not include any brackets or bearings for supporting stems.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Manufacturers' Standard List of Machine Bolts

With Square Heads and Square Nuts

Finished Points. Effective September 1, 1923 Price per 100

Diam- eter In.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	7/8	1	1 1/8	1 1/4
Length Inches											
1 1/2	\$ 1.70	\$2.00	\$ 2.40	\$ 3.00	\$ 3.70	\$ 5.50	\$ 7.70	\$10.50	\$15.10	\$22.50	\$30.00
2	1.80	2.15	2.60	3.25	4.00	5.90	8.25	11.20	16.00	23.70	31.50
2 1/2	1.90	2.30	2.80	3.50	4.30	6.30	8.80	11.90	16.90	24.90	33.00
3	2.00	2.45	3.00	3.75	4.60	6.70	9.35	12.60	17.80	26.10	34.50
3 1/2	2.10	2.60	3.20	4.00	4.90	7.10	9.90	13.30	18.70	27.30	36.00
4	2.20	2.75	3.40	4.25	5.20	7.50	10.45	14.00	19.60	28.50	37.50
4 1/2	2.30	2.90	3.60	4.50	5.50	7.90	11.00	14.70	20.50	29.70	39.00
5	2.40	3.05	3.80	4.75	5.80	8.30	11.55	15.40	21.40	30.90	40.50
5 1/2	2.50	3.20	4.00	5.00	6.10	8.70	12.10	16.10	22.30	32.10	42.00
6	2.60	3.35	4.20	5.25	6.40	9.10	12.65	16.80	23.20	33.30	43.50
6 1/2	3.70	4.50	5.40	6.50	7.70	9.50	13.20	17.50	24.10	34.50	45.00
7	3.80	4.65	5.60	6.75	8.00	9.90	13.75	18.20	25.00	35.70	46.50
7 1/2	3.90	4.80	5.80	7.00	8.30	10.30	14.30	18.90	25.90	36.90	48.00
8	4.00	4.95	6.00	7.25	8.60	10.70	14.85	19.60	26.80	38.10	49.50
9	4.20	5.25	6.40	7.75	9.20	11.50	15.95	21.00	28.60	40.50	52.50
10	4.40	5.55	6.80	8.25	9.80	12.30	17.05	22.40	30.40	42.90	55.50
11	4.60	5.85	7.20	8.75	10.40	13.10	18.15	23.80	32.20	45.30	58.50
12	4.80	6.15	7.60	9.25	11.00	13.90	19.25	25.20	34.00	47.70	61.50
13	.....	.....	8.00	9.75	11.60	14.70	20.35	26.60	35.80	50.10	64.50
14	.....	.....	8.40	10.25	12.20	15.50	21.45	28.00	37.60	52.50	67.50
15	.....	.....	8.80	10.75	12.80	16.30	22.55	29.40	39.40	54.90	70.50
16	.....	.....	9.20	11.25	13.40	17.10	23.65	30.80	41.20	57.30	73.50
17	.....	.....	9.60	11.75	14.00	17.90	24.75	32.20	43.00	59.70	76.50
18	.....	.....	10.00	12.25	14.60	18.70	25.85	33.60	44.80	62.10	79.50
19	.....	.....	10.40	12.75	15.20	19.50	26.95	35.00	46.60	64.50	82.50
20	.....	.....	10.80	13.25	15.80	20.30	28.05	36.40	48.40	66.90	85.50
21	.....	.....	.....	.....	16.40	21.10	29.15	37.80	50.20	69.30	88.50
22	.....	.....	.....	.....	17.00	21.90	30.25	39.20	52.00	71.70	91.50
23	.....	.....	.....	.....	17.60	22.70	31.35	40.60	53.80	74.10	94.50
24	.....	.....	.....	.....	18.20	23.50	32.45	42.00	55.60	76.50	97.50
25	.....	.....	.....	.....	18.80	24.30	33.55	43.40	57.40	78.90	100.50
26	.....	.....	.....	.....	.....	.....	34.65	44.80	59.20	81.30	103.50
27	.....	.....	.....	.....	.....	.....	35.75	46.20	61.00	83.70	106.50
28	.....	.....	.....	.....	.....	.....	36.85	47.60	62.80	86.10	109.50
29	.....	.....	.....	.....	.....	.....	37.95	49.00	64.60	88.50	112.50
30	.....	.....	.....	.....	.....	.....	39.05	50.40	66.40	90.90	115.50

The following extras are understood as a part of this list:
Bolts with Hexagon Heads or Hexagon Nuts, 10 per cent extra.
If both Hexagon Heads and Hexagon Nuts, 20 per cent extra.
Special Bolts with irregular threads and unusual dimensions of heads or nuts will be charged extra at the discretion of the manufacturer.
Bolts without nuts, 6 inches and shorter, 10 per cent additional discount.
Longer than 6 inches, 5 per cent additional discount.
Machine Bolts when fitted with U. S. Standard Square Nuts, add 5 per cent.
Machine Bolts when fitted with U. S. Standard Hexagon Nuts, add 15 per cent.
Intermediate lengths take next higher list.
Unless otherwise specified, bolts will be furnished with manufacturer's square heads and United States Standard hexagonal nuts and charged at an extra price of 15 per cent on above list.

SMOOTH-ON CEMENT



Fig. 9031

Smooth-on Elastic Cement for use as a pipe cement, for patching leaks for making gaskets, etc., is carried in stock in 5 pound cans

Price on Application

GENERAL DIMENSIONS

In the following pages we have given the general dimensions and data pertaining to many articles encountered by the draughtsman or engineer in completing a piping drawing.

These dimension tables are as complete as they could be made in a publication such as this volume, and we have appended such tables and other data as have become useful in our own drawing room.

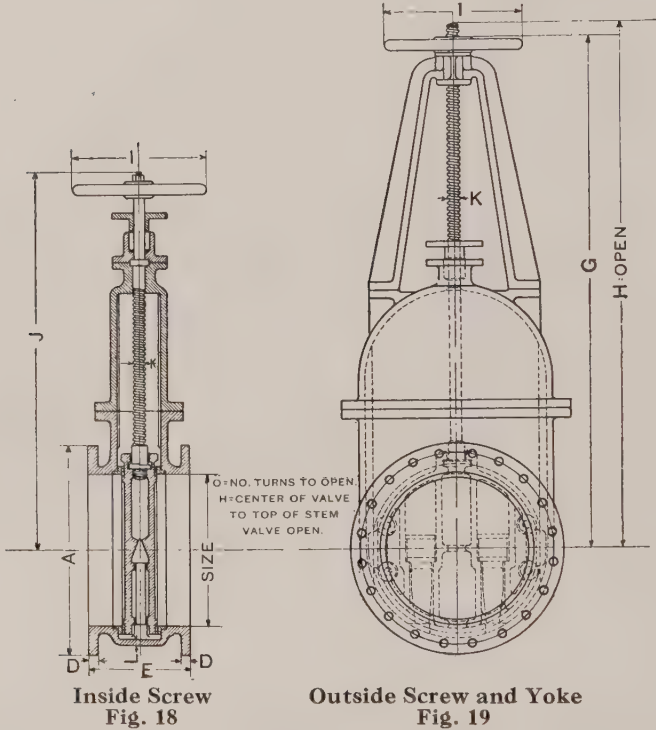
Many of these data tables have been compiled by us and will not be found elsewhere, and we trust that the information contained herein may supply what we believe to be a much needed addition to the fund of general information pertaining to this branch of the engineering trades.

LOW PRESSURE FLANGED GATE
VALVES No. 1 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.

30 POUNDS WORKING STEAM PRESSURE

50 POUNDS WORKING WATER PRESSURE



Size. in.	14	16	18	20	22	24	26	28	30	32	36	42	48	54
A	21	23 1/2	25	27 1/2	29 1/2	32	34 1/4	36 1/2	38 3/4	41 3/4	46	53	59 1/2	66 1/4
D	1 3/8	1 7/16	1 9/16	1 11/16	1 13/16	1 7/8	2	2 1/16	2 1/8	2 1/4	2 3/8	2 5/8	2 3/4	3
E	12	12 1/2	13 1/2	14	15	16	16 1/2	17	17 1/2	18 1/2	21 1/2	23	25	28
G	49 1/8	54 7/8	62 7/8	66 1/8	74 1/2	77 1/2	84 1/4	90	93 3/4	98 3/4	111 1/2	125 3/4	151 1/2	166
H	64 1/4	72 3/8	83	87	98 3/4	103 3/4	112 1/2	127 1/2	127 1/2	132 3/4	148 1/4	170 5/8	203 3/8	223 1/8
I	15	15	18	18	21	21	21	27	27	27	32	36	36	36
J	36 5/8	39 7/8	44 5/8	48	53 3/4	56 7/8	60	65 3/4	68 3/8	71 3/8	80 5/8	90 3/4	102 1/2	112
K	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2	2	2	2 1/4	2 3/4	3	3
L	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2	2	2	2 1/4	2 3/4	3	3
O	28	33	37	40	45	49	54	58	61	65	72	85	100	111

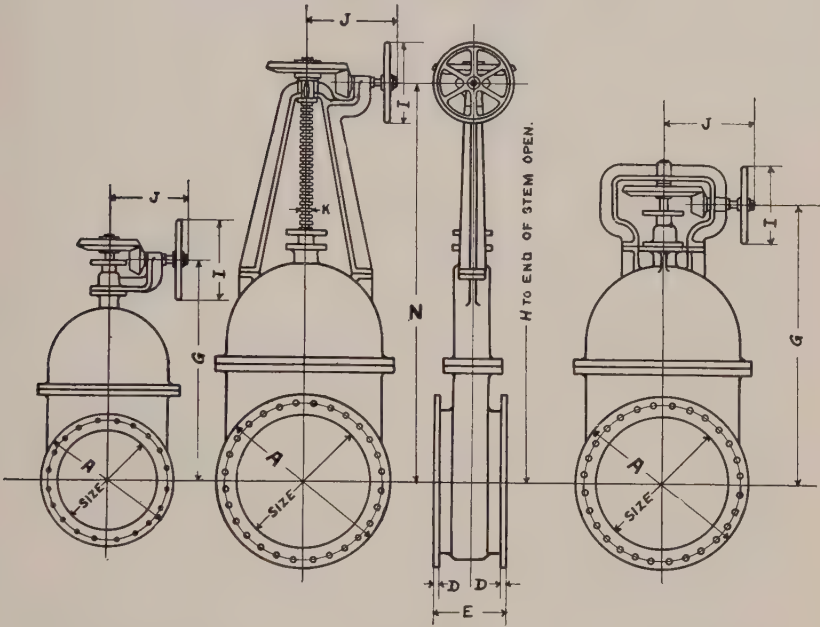
For drilling, see page 383.
For description, see page 50.
For price list, see page 56.

LOW PRESSURE FLANGED GATE VALVES No. 1 P

BEVEL GEARED

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.

30 POUNDS WORKING STEAM PRESSURE
50 POUNDS WORKING WATER PRESSURE



Inside Screw
Fig. 130

Outside Screw
Fig. 131

Inside Screw
Fig. 132

12 inches to 32 inches, inclusive "L" = Thickness of metal
"O" = Number of turns to open

Size. in.	14	16	18	20	22	24	26	28	30	32	36	42	48	54
A	21	23 ¹ / ₂	25	27 ¹ / ₂	29 ¹ / ₂	32	34 ¹ / ₄	36 ¹ / ₂	38 ³ / ₄	41 ³ / ₄	46	53	59 ¹ / ₂	66 ¹ / ₄
D	1 ³ / ₈	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ¹¹ / ₁₆	1 ¹³ / ₁₆	1 ⁷ / ₈	2	2 ¹ / ₁₆	2 ¹ / ₈	2 ¹ / ₄	2 ³ / ₈	2 ⁵ / ₈	2 ³ / ₄	3
E	12	12 ¹ / ₂	13 ¹ / ₂	14	15	16	16 ¹ / ₂	16 ¹ / ₂	17	17 ¹ / ₂	18 ¹ / ₂	21 ¹ / ₂	23	25
G	32 ¹ / ₂	35 ³ / ₄	40 ¹ / ₂	43 ⁷ / ₈	49 ¹ / ₂	52 ⁵ / ₈	56 ³ / ₄	60 ³ / ₄	62 ¹ / ₈	66 ³ / ₈	75 ¹ / ₂	85 ¹⁵ / ₁₆	98 ¹ / ₄	106 ¹ / ₂
H	64 ¹ / ₄	72 ³ / ₈	82 ³ / ₈	87	98	103 ³ / ₄	112 ¹ / ₂	120 ¹ / ₄	126 ¹ / ₄	132 ³ / ₄	148 ¹ / ₄	170 ⁵ / ₈	203	223 ¹ / ₈
I	15	15	15	15	18	18	18	21	21	21	27	27	32	32
J	14 ³ / ₄	14 ³ / ₄	14 ³ / ₄	14 ³ / ₄	16 ³ / ₄	16 ³ / ₄	16 ³ / ₄	17	17	17	21 ¹ / ₄	24 ¹ / ₄	27 ³ / ₈	27 ³ / ₈
K	1 ¹ / ₄	1 ¹ / ₄	1 ¹ / ₂	1 ¹ / ₂	1 ³ / ₄	1 ³ / ₄	1 ³ / ₄	2	2	2	2 ¹ / ₄	2 ³ / ₄	3	3
L	5 ⁵ / ₈	1 ¹¹ / ₁₆	3 ³ / ₄	7 ⁷ / ₈	7 ⁷ / ₈	7 ⁷ / ₈	1 ³ / ₄	1 ³ / ₄	1	1 ¹ / ₁₆	1 ¹ / ₈	1 ¹ / ₂	1 ¹ / ₂	1 ⁵ / ₈
N	47 ⁹ / ₁₆	53 ⁵ / ₁₆	61 ⁵ / ₁₆	64 ⁹ / ₁₆	71 ⁷ / ₁₆	74 ⁷ / ₁₆	81 ³ / ₁₆	86 ¹¹ / ₁₆	89 ³ / ₁₆	95 ⁷ / ₁₆	108 ³ / ₁₆	120 ³ / ₁₆	145 ³ / ₄	160 ¹ / ₄
O	57	66	74	80	105	114	126	135	142	152	216	340	495	556

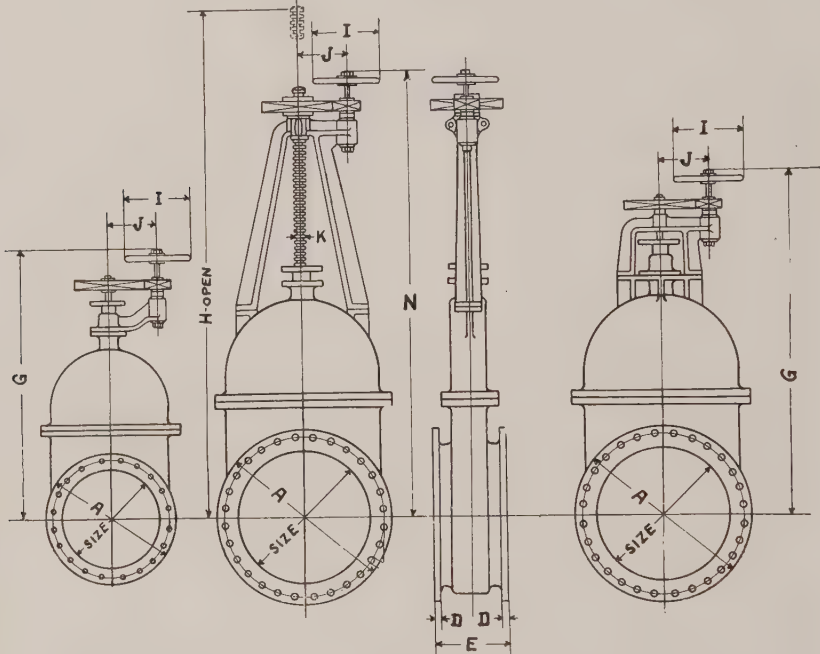
For drilling, see page 383. For description, see page 50. For price list, see page 56.

LOW PRESSURE FLANGED GATE
VALVES No. 1 P

Spur Geared.

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT

30 POUNDS WORKING STEAM PRESSURE
50 POUNDS WORKING WATER PRESSURE



Inside Screw
Fig. 133

18 inches to 32 inches inclusive

Outside Screw
Fig. 134

L—Thickness of metal

Inside Screw
Fig. 135

36 inches and above

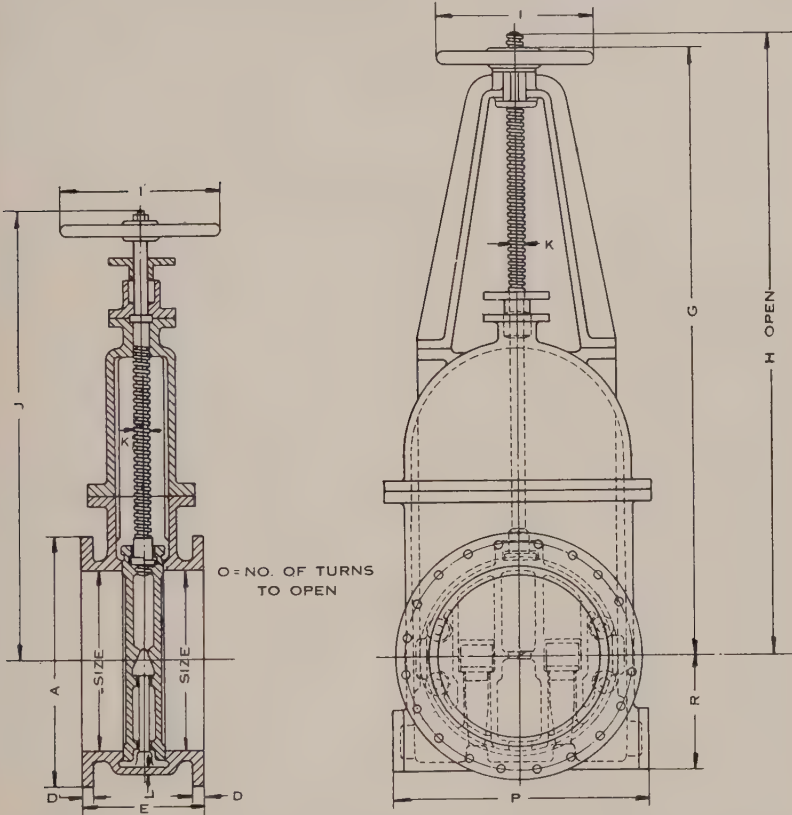
O—Number of turns to open

Size in.	14	16	18	20	22	24	26	28	30	32	36	42	48	54
A	21	23 $\frac{1}{2}$	25	27 $\frac{1}{2}$	29 $\frac{1}{2}$	32	34 $\frac{1}{4}$	36 $\frac{1}{2}$	38 $\frac{3}{4}$	41 $\frac{3}{4}$	46	53	59 $\frac{1}{2}$	66 $\frac{1}{4}$
D	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{9}{16}$	1 $\frac{11}{16}$	1 $\frac{3}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{16}$	2 $\frac{1}{8}$	2 $\frac{3}{4}$	2 $\frac{3}{8}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	3
E	12	12 $\frac{1}{2}$	13 $\frac{1}{2}$	14	15	16	16 $\frac{1}{2}$	16 $\frac{1}{2}$	17	17 $\frac{1}{2}$	18 $\frac{1}{2}$	21 $\frac{1}{2}$	23	25
G	42 $\frac{1}{4}$	45 $\frac{1}{2}$	50 $\frac{3}{8}$	53 $\frac{3}{4}$	59 $\frac{3}{8}$	62 $\frac{1}{2}$	65 $\frac{5}{8}$	70 $\frac{5}{8}$	72	76 $\frac{1}{4}$	91 $\frac{3}{8}$	102 $\frac{1}{8}$	114 $\frac{3}{8}$	122 $\frac{3}{8}$
H	64 $\frac{1}{4}$	72 $\frac{3}{8}$	82 $\frac{3}{8}$	87	98	103 $\frac{3}{4}$	112 $\frac{1}{2}$	120 $\frac{1}{4}$	126 $\frac{1}{4}$	132 $\frac{3}{4}$	148 $\frac{1}{4}$	170 $\frac{3}{8}$	203	223 $\frac{1}{8}$
I	15	15	15	15	18	18	18	18	18	18	21	21	27	27
J	9	9	9	9	11	11	11	11	11	11	13 $\frac{1}{2}$	15	16 $\frac{1}{2}$	16 $\frac{1}{2}$
K	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2	2	2	2 $\frac{1}{4}$	2 $\frac{3}{4}$	3	3
L	5 $\frac{5}{8}$	6 $\frac{1}{16}$	6 $\frac{3}{4}$	7 $\frac{7}{8}$	7 $\frac{7}{8}$	7 $\frac{7}{8}$	8 $\frac{1}{16}$	1	1	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$
N	55	60 $\frac{3}{4}$	68 $\frac{3}{4}$	72	80 $\frac{1}{4}$	83 $\frac{1}{4}$	90 $\frac{1}{8}$	95 $\frac{5}{8}$	98 $\frac{1}{8}$	104 $\frac{3}{8}$	117 $\frac{1}{4}$	131 $\frac{1}{4}$	157 $\frac{1}{8}$	171 $\frac{5}{8}$
O	57	66	74	80	120	131	144	155	163	173	252	340	497	556

For drilling, see page 383. For description, see page 50. For price list, see page 56.

LOW PRESSURE FLANGED GATE
VALVES No. 1 P

WITH CLEANOUT POCKETS. IRON BODY. PARALEL SEAT.
30 POUNDS WORKING GAS PRESSURE



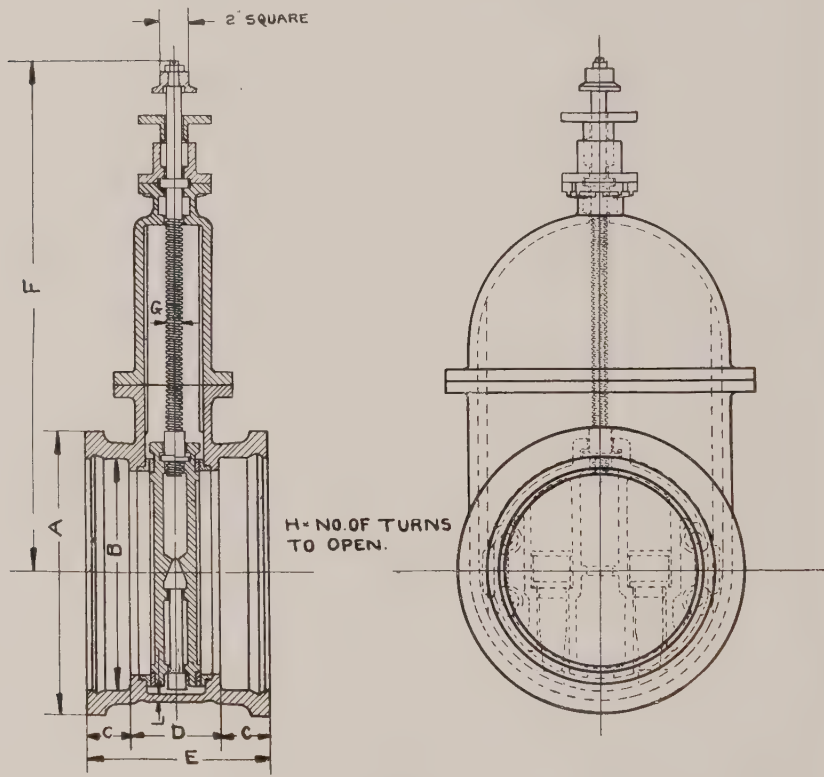
Inside Screw—Fig. 128

Outside Screw—Fig. 129

Size. in.	14	16	18	20	22	24	26	28	30	32	36	42	48	54
A	21	23 1/2	25	27 1/2	29 1/2	32	34 1/4	36 1/2	38 3/4	41 3/4	46	53	59 1/2	66 1/4
D	1 3/8	1 7/16	1 9/16	1 11/16	1 13/16	1 7/8	2	2 1/16	2 1/8	2 1/4	2 3/8	2 5/8	2 3/4	3
E	12	12 1/2	13 1/2	14	15	16	16 1/2	16 1/2	17	17 1/2	18 1/2	21 1/2	23	25
G	49	54 7/8	62 7/8	66 1/8	74 1/2	77 1/2	84 1/4	90	93 3/4	98 3/4	111 1/2	125 3/4	151 1/8	166
H	64 1/4	72 3/8	83	87	98 3/4	103 3/4	112 1/2	120 1/4	127 1/2	132 3/4	148 1/4	170 5/8	203 3/8	223 1/8
I	15	15	18	18	21	21	21	27	27	27	32	36	36	36
J	36 5/8	39 7/8	44 5/8	48	53 3/4	56 7/8	60	65 3/4	68 3/8	71 3/8	80 5/8	90 3/4	102 1/2	112
K	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2	2	2	2 1/4	2 3/4	3	3
L	1 5/8	1 11/16	1 11/16	1 7/8	1 7/8	1 7/8	1 5/8	1	1	1 1/16	1 1/8	1 1/2	1 1/2	1 5/8
O	28	33	37	40	45	49	54	58	61	65	72	85	100	111
P	20 3/4	22 5/8	26 3/4	27 3/8	29 3/4	32 1/2	34 7/8	37 1/4	38	41 1/2	45 1/2	51 1/2	60 3/4	66 1/2
R	9	10 3/16	11 5/8	12 7/16	13 5/8	15	16 1/16	17 1/8	17 1/2	19 3/16	21 3/8	24 3/4	29	31 1/4

For drilling, see page 383.

LOW PRESSURE HUB END GATE
VALVES No. 1 P
IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.
50 POUNDS WORKING WATER PRESSURE



Inside Screw
Fig. 127

Size . in.	8	10	12	14	16	18	20	22	24	26	28	30	36
A	12 1/2	14 3/4	17 1/4	19 5/8	21 3/4	23 7/8	26 1/4	28 1/2	30 5/8	32 3/4	35	37 1/2	44 1/2
B	10	12 1/8	14 1/4	16 3/8	18 1/2	20 5/8	22 3/4	24 7/8	27	29 1/8	31 1/4	33 3/8	39 3/4
C	4	4	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	5	5	5	5	5	5
D	7	7 1/2	7	7 1/2	7 1/2	8	8 1/2	8 1/2	9	9 1/2	9 1/2	10	11
E	15	15 1/2	16	16 1/2	16 1/2	17	17 1/2	18 1/2	19	19 1/2	19 1/2	20	21
F	26 7/8	30	33 5/8	36 5/8	39 7/8	44 5/8	48	53 3/4	56 7/8	60	65 3/4	68 3/8	80 5/8
G	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2	2	2 1/4
H	33	42	50	28	33	37	40	45	49	54	58	61	72
L	7/16	1/2	9/16	5/8	11/16	3/4	7/8	7/8	7/8	15/16	1	1	1 1/8

For description, see page 50.
For price list, see page 57.

ATMOSPHERIC OUTLET GATE VALVES
30 POUNDS WORKING STEAM PRESSURE

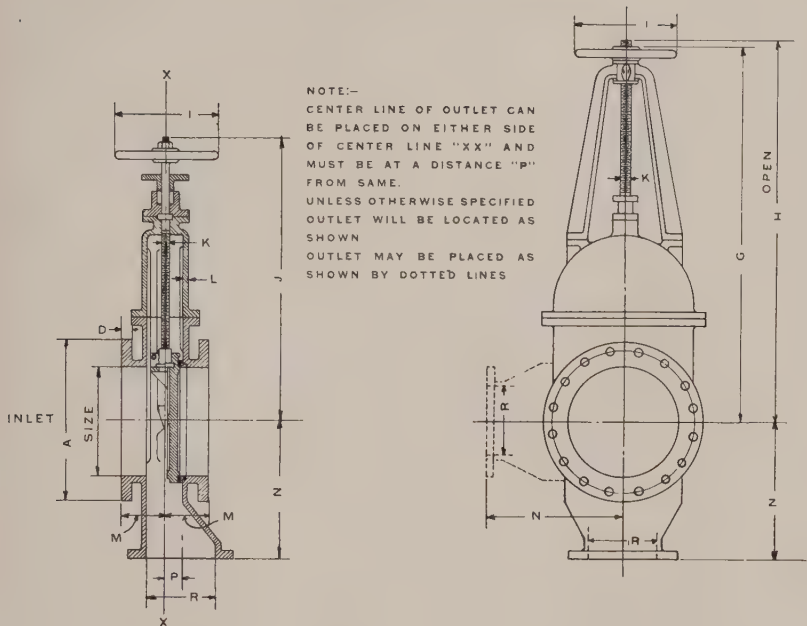


Fig. 1001 "O"=Number of turns to open Fig. 1002

Size Valve	A	D	G	H	I	J	K	L	M	O
10	16	1 ³ / ₁₆	36 ⁷ / ₁₆	59	12	29 ¹⁵ / ₁₆	1 ¹ / ₈	1 ¹ / ₂	5 ¹ / ₄	42
12	19	1 ¹ / ₄	44 ³ / ₁₆	58 ¹ / ₈	15	33 ³ / ₁₆	1 ¹ / ₄	1 ⁵ / ₈	5 ¹ / ₂	25
14	21	1 ³ / ₈	49	64 ¹ / ₄	15	36 ⁵ / ₈	1 ¹ / ₄	1 ⁹ / ₈	6	28
16	23 ¹ / ₂	1 ⁷ / ₈	54 ⁷ / ₈	72 ³ / ₈	15	39 ⁷ / ₈	1 ¹ / ₄	1 ¹ / ₂	6 ¹ / ₄	33
18	25	1 ⁹ / ₈	62 ³ / ₈	82 ³ / ₈	18	44 ³ / ₈	1 ¹ / ₂	1 ³ / ₄	6 ³ / ₄	37
20	27 ¹ / ₄	1 ¹¹ / ₈	66 ¹ / ₈	87	18	48	1 ¹ / ₂	1 ³ / ₄	7	40
22	29 ¹ / ₂	1 ¹³ / ₈	74 ¹ / ₄	98	21	53 ¹ / ₄	1 ³ / ₄	1 ⁷ / ₈	7 ¹ / ₂	45
24	32	1 ⁵ / ₈	77 ¹ / ₂	103 ³ / ₄	21	56 ⁷ / ₈	1 ³ / ₄	1 ⁷ / ₈	8	49
26	34 ¹ / ₄	2	84 ¹ / ₄	112 ¹ / ₂	21	60	1 ³ / ₄	1 ¹ / ₂	8 ¹ / ₄	54
28	36 ¹ / ₂	2 ¹ / ₈	90	120 ¹ / ₄	27	65 ³ / ₄	2	1	8 ¹ / ₄	58
30	38 ³ / ₄	2 ¹ / ₄	92 ¹ / ₂	126 ¹ / ₄	27	67 ¹ / ₂	2	1 ¹ / ₈	8 ¹ / ₂	61
32	41 ³ / ₄	2 ¹ / ₂	98 ³ / ₄	132 ³ / ₄	27	71 ³ / ₄	2	1 ¹ / ₄	8 ³ / ₄	65
36	46	2 ³ / ₄	111	148 ¹ / ₄	32	80 ⁵ / ₈	2 ¹ / ₄	1 ¹ / ₂	9 ¹ / ₄	72
42	53	2 ⁵ / ₈	125 ¹ / ₂	170 ³ / ₈	36	90 ³ / ₄	2 ³ / ₄	1 ¹ / ₂	10 ³ / ₄	85
48	59 ¹ / ₂	2 ³ / ₄	151 ¹ / ₂	203	36	102 ¹ / ₂	3	1 ¹ / ₂	11 ¹ / ₂	100
54	66 ¹ / ₄	3	166	223 ¹ / ₈	36	112	3	1 ⁵ / ₈	12 ¹ / ₂	111
60	73	3 ¹ / ₈	178 ¹ / ₄	243	42	121 ¹ / ₂	3 ¹ / ₄	1 ³ / ₄	15	124
66	80	3 ³ / ₈	.....	.....	42	.....	3 ¹ / ₂	2 ¹ / ₂	18	.....
72	86 ¹ / ₂	3 ¹ / ₂	.....	.....	42	.....	3 ³ / ₄	1 ¹ / ₂	14 ³ / ₄	.....

For drilling, see page 383. For description, see page 59. For price list, see page 60. For standard size of outlet, see page 368.

ATMOSPHERIC OUTLET GATE VALVES
30 POUNDS WORKING STEAM PRESSURE

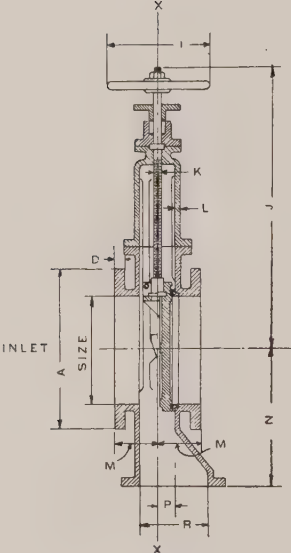


Fig. 1003

NOTE
CENTER LINE OF OUTLET CAN
BE PLACED ON EITHER SIDE
OF CENTER LINE "XX" AND
MUST BE AT A DISTANCE "P"
FROM SAME.
UNLESS OTHERWISE SPECIFIED
OUTLET WILL BE LOCATED AS
SHOWN
OUTLET MAY BE PLACED AS
SHOWN BY DOTTED LINES

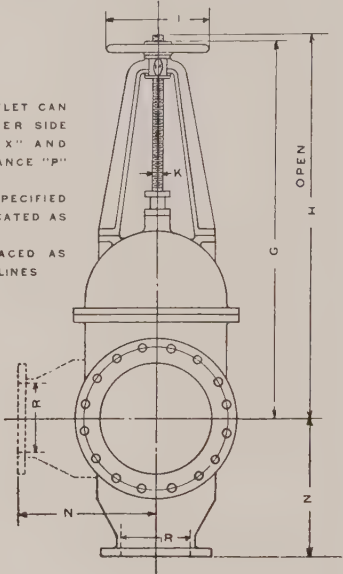


Fig. 1004

Standard Sizes of Outlets

Size of Valve	N	P	R	N	P	R	N	P	R	N	P	R	N	P	R	N	P	R
10	15 1/2	1 7/8	8	13 1/2	7/8	6	...	...	...	...	...	...	...	...	...	...	...	...
12	16 1/2	1 3/4	8	14 1/2	3/4	6	...	...	...	...	...	...	...	...	...	...	...	...
14	20	2 9/16	10	18	1 9/16	8	16	9/16	6	...	...	...	...	...	...	...	...	...
16	21 1/2	2 9/16	10	19 1/2	1 9/16	8	17 1/2	9/16	6	...	...	...	...	...	...	...	...	...
18	23	3 3/8	12	22	2 3/8	10	20	1 3/8	8	18	3/8	6	...	...	...	...	...	...
20	24 1/2	3 3/8	12	23 1/2	2 3/8	10	21 1/2	1 3/8	8	21 1/2	1 3/8	6	...	...	...	...	...	...
22	27	4	14	25 1/2	3	12	24 1/2	2	10	22 1/2	1	8	...	...	...	...	...	...
24	28	3 7/8	14	26 1/2	2 7/8	12	25 1/2	1 7/8	10	23 1/2	7/8	8	...	...	...	...	...	...
26	30	4 3/8	15	29	3 7/8	14	27 1/2	2 7/8	12	26 1/2	1 7/8	10	24 1/2	7/8	8	...	...	...
28	31	4 1/2	15	30	4	14	28 1/2	3	12	27 1/2	2	10	25 1/2	1	8	...	...	...
30	33	5	16	32	4 1/2	15	31	4	14	29 1/2	3	12	28 1/2	2	10	26 1/2	1	8
32	35	5	16	34	4 1/2	15	33	4	14	31 1/2	3	12	30 1/2	2	10	28 1/2	1	8
36	39	5 7/8	18	37	4 7/8	16	36	4 3/8	15	35	3 7/8	14	33 1/2	2 7/8	12	32 1/2	1 7/8	10
42	43 1/2	6 1/8	20	42 1/2	5 1/8	18	40 1/2	4 7/8	16	39 1/2	3 5/8	15	38 1/2	3 1/8	14	37	2 1/8	12
48	50	7 1/8	24	47	5 1/2	20	46	4 1/2	18	44	3 1/2	16	43	3	15	42	2 1/2	14
54	53	7 1/2	24	50	5 1/2	20	49	4 1/2	18	47	3 1/2	16	46	3	15	45	2 1/2	14
60	61	9 1/2	30	58 1/2	8 1/2	28	56 1/2	6 1/2	24	53 1/2	4 1/2	20	52 1/2	3 1/2	18	50 1/2	2 1/2	16
66	64	8 3/4	32	64 1/2	7 3/4	30	62	6 3/4	28	60	4 3/4	24	57	2 3/4	20	56	1 3/4	18
72	71 1/2	11	36	67 1/2	9	32	68	8	30	65 1/2	7	28	63 1/2	5	24	60 1/2	3	20

For drilling, see page 383.
For description, see page 59.
For price list, see page 60.
For dimensions of valve, see page 367.

HORIZONTAL AUTOMATIC EXHAUST
RELIEF VALVES—TOP OPERATED

IRON BODY - BRONZE MOUNTED

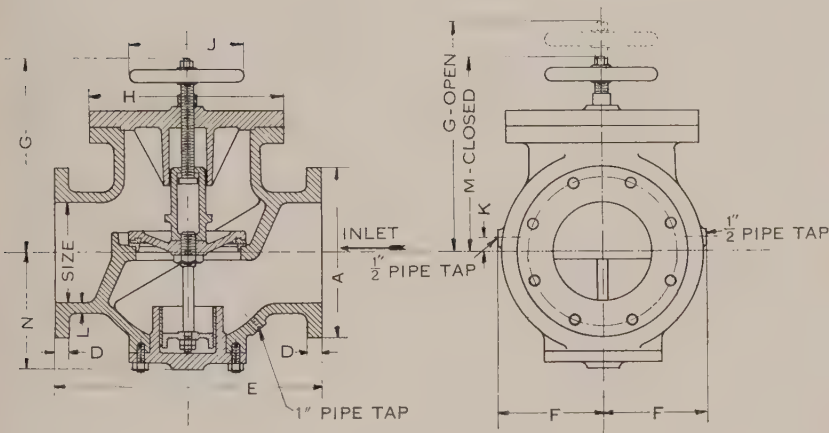


Fig. 1011

Size	A	D	E	F	G	H	J	K	L	M	N
6	11	1	17	6 1/2	16 1/4	12 1/4	9	1	5/8	14 1/8	7 3/4
7	12 1/2	1 1/16	20	8 1/4	17 7/8	15 3/8	9	1 1/16	13/16	14 3/4	9 3/4
8	13 1/2	1 1/8	21	8 1/16	18 3/8	15 3/8	9	1 1/16	13/16	15 3/4	10
10	16	1 3/16	25	10 1/4	21 3/8	19 1/4	12	1 3/8	7/8	18 1/4	12
12	19	1 1/4	27	11 3/4	24	20 1/4	12	1 3/8	15/16	20 3/8	13 3/8
14	21	1 3/8	30	12 3/4	25 7/8	23 1/2	12	1 1/4	1	21 3/4	14 1/2
16	23 1/2	1 7/16	34 1/2	14 7/8	27 3/8	26	15	1 9/16	1 1/8	23	15 1/2
18	25	1 9/16	37	16 3/8	29 1/2	27 1/2	15	1 1/2	1 3/16	24 3/8	18 3/4
20	27 1/2	1 11/16	43	19	32 3/8	30	15	2 1/4	1 3/16	26 3/4	21
24	32	1 7/8	45	21 1/4	36 3/8	37	18	2 7/16	1 1/4	29 3/4	23 1/4
28	36 1/2	2 1/16	51	26 1/4	40	44 3/4	18	2 1/2	1 3/8	32 3/8	28 1/2
30	38 3/4	2 1/8	51	26 1/4	40	44 3/4	18	2 1/2	1 3/8	32 3/8	28 1/2
36	46	2 3/8	64	32	47	53	27	2 1/8	1 1/2	37 1/4	35

For drilling, see page 383.

For description, see page 61.

For price list, see page 61.

HORIZONTAL AUTOMATIC EXHAUST
RELIEF VALVES—BOTTOM OPERATED

IRON BODY - BRONZE MOUNTED

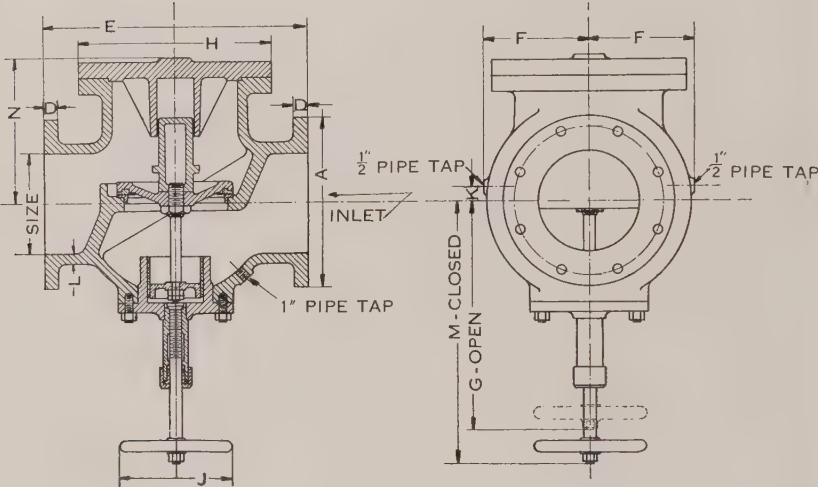


Fig. 1012

Size	A	D	E	F	G	H	J	K	L	M	N
6	11	1	17	6 1/2	16 3/4	12 1/4	9	1	5/8	18 7/8	10
7	12 1/2	1 1/16	20	8 1/4	19	15 3/8	9	1 1/16	13/16	21 3/8	10 5/8
8	13 1/2	1 1/8	21	8 1/16	19 1/4	15 3/8	9	1 1/16	13/16	21 7/8	11 5/8
10	16	1 3/16	25	10 1/4	22 3/8	19 1/4	12	1 3/8	7/8	25 3/4	13 3/4
12	19	1 1/4	27	11 3/4	24 3/8	20 1/4	12	1 3/8	15/16	28 1/4	15 5/8
14	21	1 3/8	30	12 3/4	27 1/8	23 1/2	12	1 1/4	1	31 1/4	16 7/8
16	23 1/2	1 1/16	34 1/2	14 7/8	30 3/8	26	15	1 9/16	1 1/8	35	17 3/4
18	25	1 9/16	37	16 3/8	33	27 1/2	15	1 1/2	1 3/16	38 1/8	19 1/8
20	27 1/2	1 1/16	43	19	35 5/8	30	15	2 1/4	1 3/16	41 1/4	21 3/4
24	32	1 7/8	45	21 1/4	40 1/4	37	18	2 7/16	1 1/4	46 7/8	24 5/8
28	36 1/2	2 1/16	51	26 1/4	47 3/8	44 3/4	18	2 1/2	1 3/8	55 1/4	27
30	38 3/4	2 1/8	51	26 1/4	47 5/8	44 3/4	18	2 1/2	1 3/8	55 1/4	27
36	46	2 3/8	64	32	57 7/8	53	27	2 1/8	1 1/2	67 1/2	30 1/4

For drilling, see page 383.
For description, see page 61.
For price list, see page 61.

ANGLE AUTOMATIC EXHAUST
RELIEF VALVES

IRON BODY - BRONZE MOUNTED

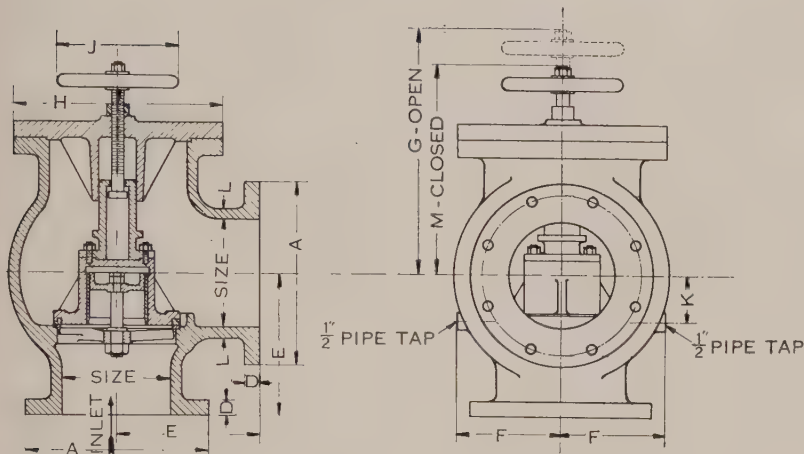


Fig. 1013

Size	A	D	E	F	G	H	J	K	L	M
6	11	1	8½	6	16¼	12¼	9	2¾	5⁄8	14⅛
7	12½	1⅛	10	7⅞	17⅛	15⅜	9	2⅝	13⁄16	14¾
8	13½	1⅜	10½	7⅝	18⅜	15⅜	9	3⅜	13⁄16	15¾
10	16	1⅜	12½	9¾	21⅜	19¼	12	4⅜	7⁄8	18¼
12	19	1¼	13½	10¾	24	20¼	12	5⅜	15⁄16	20⅜
14	21	1⅜	15	11⅝	25⅞	23½	12	6⅜	1	21¾
16	23½	1⅞	17¼	13⅝	27⅝	26	15	7⅜	1⅛	23
18	25	1⅞	18½	14½	29½	27½	15	8½	1⅜	24⅜
20	27½	1⅞	21½	17¼	32⅜	30	15	9⅜	1⅜	26¾
24	32	1⅞	22½	18¾	36⅜	37	18	11¾	1¼	29¾
28	36½	2⅞	25½	22¼	40	44¾	18	14¾	1⅜	32⅜
30	38¾	2⅞	25½	22¼	40	44¾	18	14¾	1⅜	32⅜
36	46	2⅞	32	28¾	47	53	27	16¾	1½	37¼

For drilling, see page 383.
For description, see page 61.
For price list, see page 61.

VERTICAL AUTOMATIC EXHAUST RELIEF VALVES

IRON BODY - BRONZE MOUNTED

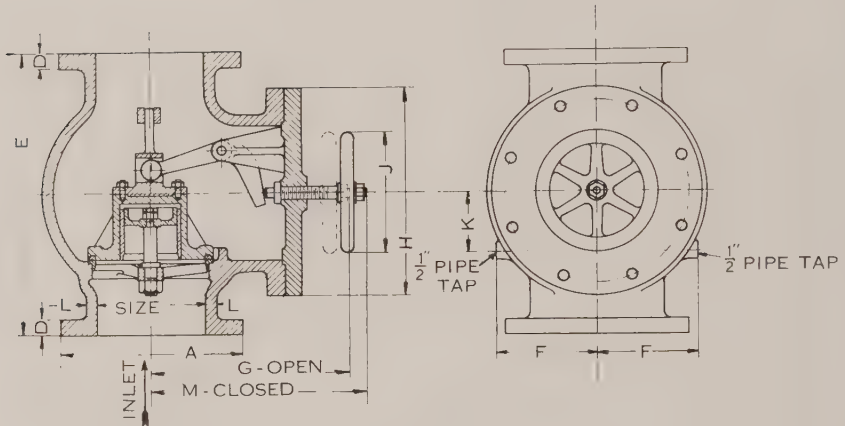


Fig. 1014

Size	A	D	E	F	G	H	J	K	L	M
6	11	1	17	6	13 ⁷ / ₈	12 ¹ / ₄	9	2 ³ / ₄	5 ⁸ / ₁₆	15 ¹ / ₄
7	12 ¹ / ₂	1 ¹ / ₁₆	20	7 ⁷ / ₈	14 ¹ / ₂	15 ³ / ₈	9	2 ⁵ / ₈	13 ¹⁵ / ₁₆	16
8	13 ¹ / ₂	1 ¹ / ₈	21	7 ⁵ / ₈	15 ¹ / ₂	15 ³ / ₈	9	3 ³ / ₈	13 ¹³ / ₁₆	17 ¹ / ₄
10	16	1 ³ / ₁₆	25	9 ³ / ₄	18 ⁷ / ₈	19 ¹ / ₄	12	4 ³ / ₈	7 ⁸ / ₁₆	20 ⁷ / ₈
12	19	1 ¹ / ₄	27	10 ³ / ₄	20	20 ¹ / ₄	12	5 ³ / ₈	15 ¹⁵ / ₁₆	22 ¹ / ₄
14	21	1 ³ / ₈	30	11 ⁵ / ₈	21 ¹ / ₄	23 ¹ / ₂	12	6 ³ / ₈	1	24
16	23 ¹ / ₂	1 ⁷ / ₁₆	34 ¹ / ₂	13 ⁵ / ₈	22 ³ / ₈	26	15	7 ³ / ₈	1 ¹ / ₈	25 ¹ / ₄
18	25	1 ⁹ / ₁₆	37	14 ¹ / ₂	23 ⁷ / ₈	27 ¹ / ₂	15	8 ¹ / ₂	1 ³ / ₁₆	27
20	27 ¹ / ₂	1 ¹¹ / ₁₆	43	17 ¹ / ₄	26 ³ / ₈	30	15	9 ³ / ₈	1 ³ / ₁₆	30
24	32	1 ⁷ / ₈	45	18 ³ / ₄	29 ¹ / ₄	37	18	11 ³ / ₄	1 ¹ / ₄	33 ³ / ₄
28	36 ¹ / ₂	2 ¹ / ₁₆	51	22 ¹ / ₄	31 ⁵ / ₈	44 ³ / ₄	18	14 ³ / ₄	1 ³ / ₈	36 ¹ / ₄
30	38 ³ / ₄	2 ¹ / ₈	51	22 ¹ / ₄	31 ⁵ / ₈	44 ³ / ₄	18	14 ³ / ₄	1 ³ / ₈	36 ¹ / ₄
36	46	2 ³ / ₈	64	28 ¹ / ₄	36	53	27	16 ³ / ₄	1 ¹ / ₂	42

For drilling, see page 383.

For description, see page 61.

For price list, see page 61.

AUTOMATIC EXHAUST RELIEF VALVES, CHIMNEY TYPE

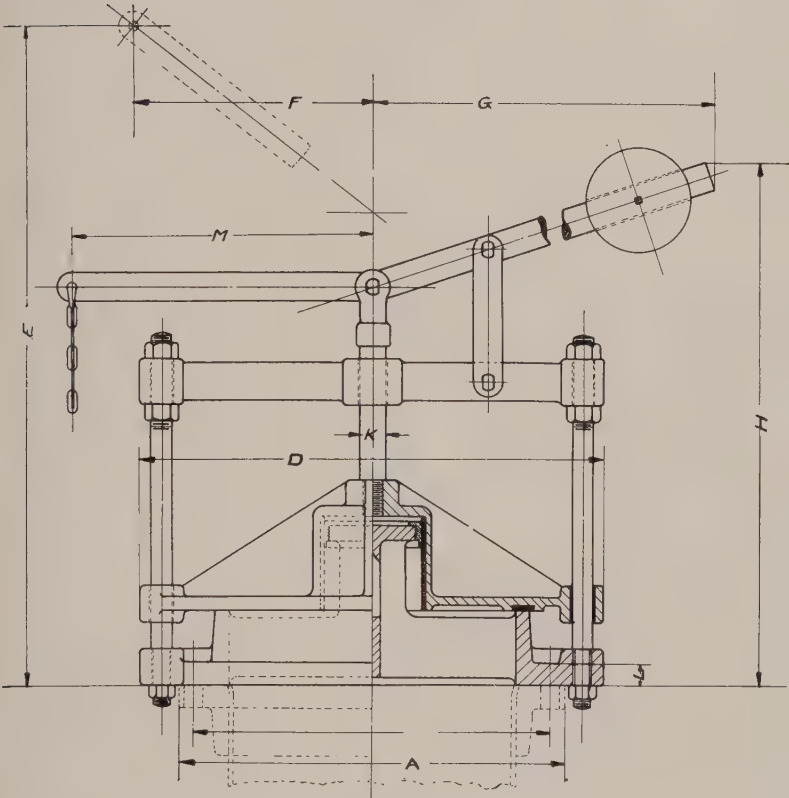


Fig. 139

Size. in.	16	18	20	22	24	28	30	36	40	42	48
A	23 ¹ / ₂	25	27 ¹ / ₂	29 ¹ / ₂	32	36 ¹ / ₂	38 ³ / ₄	46	50 ³ / ₄	53	59 ¹ / ₂
D	28 ³ / ₄	30 ¹ / ₄	33 ¹ / ₄	35 ¹ / ₄	37 ³ / ₄	42 ¹ / ₂	45 ³ / ₄	55 ¹ / ₄	60	63	71
E	41 ¹ / ₄	44	47 ³ / ₄	50 ¹ / ₄	54 ¹ / ₄	62	65 ¹ / ₄	75	82	87	97
F	15 ¹ / ₂	16 ¹ / ₂	18	18 ¹ / ₂	20	22 ¹ / ₂	23 ¹ / ₄	28	31	32	37
G	38 ¹ / ₂	40	45 ³ / ₄	48 ¹ / ₂	55	63	68 ¹ / ₂	80	89 ¹ / ₄	92	108
H	37	41	45	48	51 ³ / ₄	60 ¹ / ₂	64 ¹ / ₂	73 ¹ / ₂	81	84 ¹ / ₄	95
K	1 ³ / ₄	1 ³ / ₄	2	2	2	2 ¹ / ₄	2 ¹ / ₄	2 ¹ / ₄	2 ¹ / ₂	3	3
L	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ¹¹ / ₁₆	1 ¹³ / ₁₆	1 ⁷ / ₈	2 ¹ / ₁₆	2 ¹ / ₈	2 ³ / ₈	2 ¹ / ₂	2 ⁵ / ₈	2 ³ / ₄
M	19 ¹ / ₄	21 ¹ / ₄	23	23	23	28 ³ / ₄	29 ³ / ₄	32	43	40 ¹ / ₂	46 ¹ / ₂

For drilling, see page 383.

LOW PRESSURE BUTTERFLY VALVES

ALL IRON

FOR WORKING PRESSURES UP TO 30 POUNDS

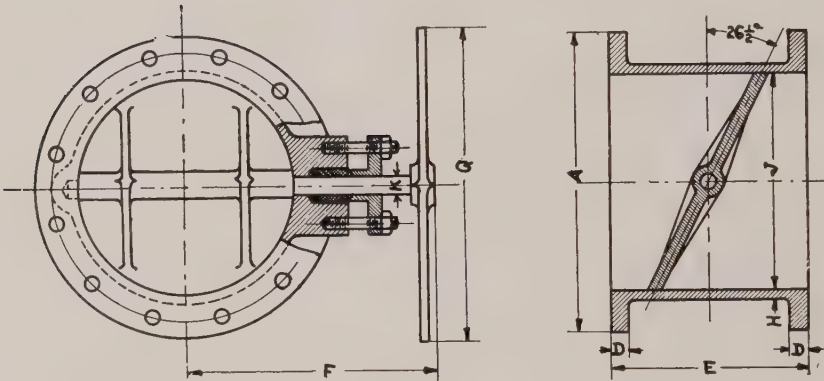


Fig. 141

Size Inches	A	D	E	F	G	H	J	K
4	9	$\frac{15}{16}$	6	$7\frac{7}{8}$	16	$\frac{3}{8}$	4	$\frac{3}{4}$
5	10	$\frac{15}{16}$	6	$8\frac{3}{8}$	16	$\frac{3}{8}$	5	$\frac{3}{4}$
6	11	1	$6\frac{1}{4}$	$8\frac{7}{8}$	16	$\frac{7}{16}$	6	$\frac{3}{4}$
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$6\frac{1}{2}$	$9\frac{3}{8}$	18	$\frac{7}{16}$	7	$\frac{3}{4}$
8	$13\frac{1}{2}$	$1\frac{1}{8}$	7	$10\frac{1}{2}$	18	$\frac{7}{16}$	8	$\frac{7}{8}$
10	16	$1\frac{3}{16}$	$7\frac{1}{4}$	$11\frac{5}{8}$	18	$\frac{1}{2}$	10	$\frac{7}{8}$
12	19	$1\frac{1}{4}$	8	14	20	$\frac{9}{16}$	12	1
14	21	$1\frac{3}{8}$	$9\frac{1}{4}$	16	20	$\frac{5}{8}$	14	$1\frac{1}{8}$
15	$22\frac{1}{4}$	$1\frac{3}{8}$	10	$16\frac{7}{8}$	24	$\frac{5}{8}$	15	$1\frac{1}{4}$
16	$23\frac{1}{2}$	$1\frac{7}{16}$	$10\frac{3}{4}$	$17\frac{1}{2}$	24	$\frac{11}{16}$	16	$1\frac{1}{4}$
18	25	$1\frac{9}{16}$	12	$19\frac{1}{2}$	32	$\frac{3}{4}$	18	$1\frac{1}{2}$
20	$27\frac{1}{2}$	$1\frac{11}{16}$	13	$20\frac{5}{8}$	32	$\frac{7}{8}$	20	$1\frac{1}{2}$
22	$29\frac{1}{2}$	$1\frac{3}{8}$	$14\frac{1}{4}$	$22\frac{3}{8}$	36	$\frac{7}{8}$	22	$1\frac{3}{4}$
24	32	$1\frac{7}{8}$	$15\frac{1}{2}$	$23\frac{3}{8}$	36	$\frac{7}{8}$	24	$1\frac{3}{4}$

For drilling, see page 383.

For price list, see page 66.

TRANSFER VALVES
LOW PRESSURE STEAM

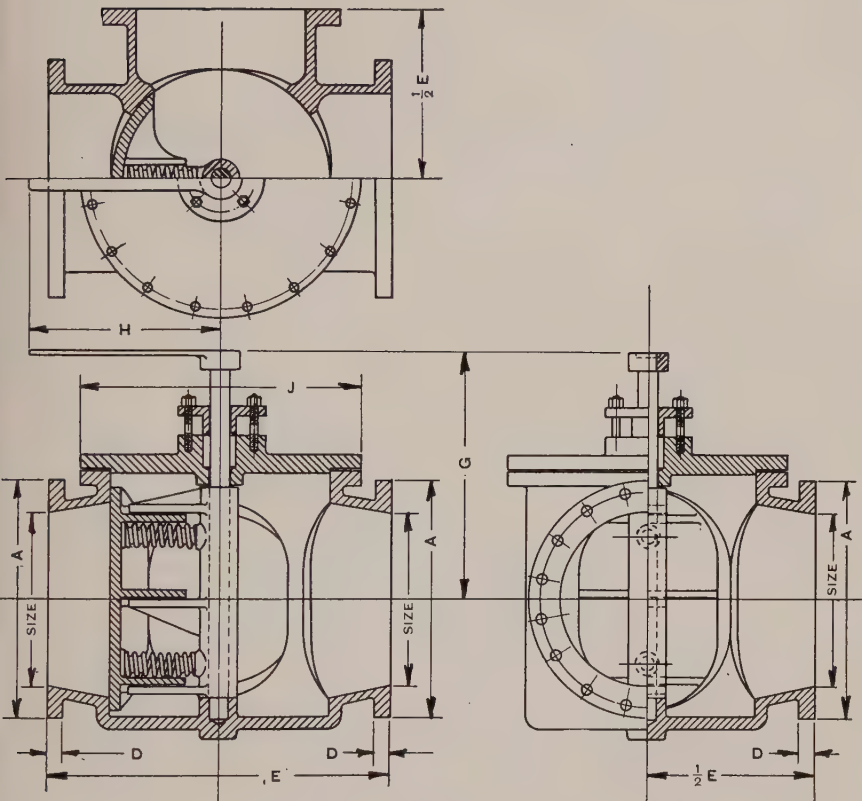


Fig. 140

Size....in.	6	7	8	10	12	14	16	18	20
A	11	12½	13½	16	19	21	23½	25	27½
D	1	1⅛	1⅛	1⅜	1¾	1⅜	1⅞	1⅞	1⅞
E	16	17	18	22	26½	28	32	36	40
G	12	13¾	15¼	15¾	16¼	19½	22	26¼	27½
H	8	8	10	12	14	14	16	20	22
J	12	13	15	16½	19⅝	23¼	27⅝	29½	32½
½ E	8	8½	9	11	13¼	14	16	18	20

For drilling, see page 383.

For price list, see page 67.

FOOT VALVES WITH STRAINERS
30 POUNDS WORKING WATER PRESSURE

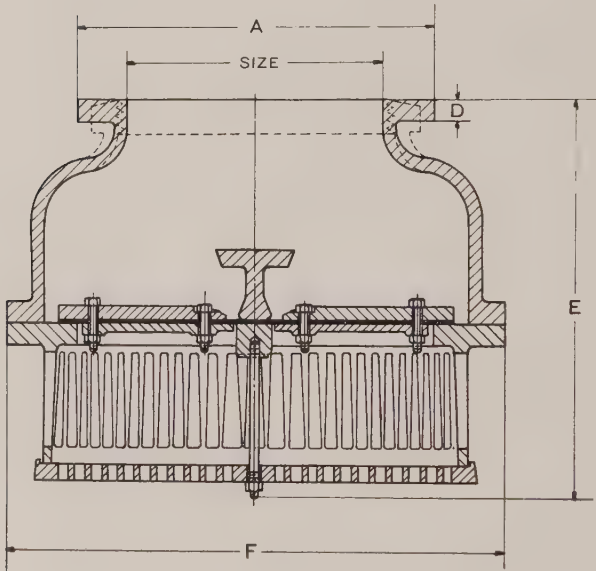


Fig. 142

Size...in.	7	8	9	10	12	14	15	16	18
A	12½	13½	15	16	19	21	22¼	23½	25
D	1⅙	1⅛	1⅛	1⅜	1¼	1⅜	1⅜	1⅞	1⅞
E	15½	15½	....	17¾	20¾	22¾	....	24¾	28⅜
F	16	16	....	19¾	22½	25	....	30	35

For drilling, see page 383.

For price list, see page 68.

CAST IRON FLANGED STRAINERS

REMOVABLE WIRE BASKET
PRESSURE UP TO 30 POUNDS

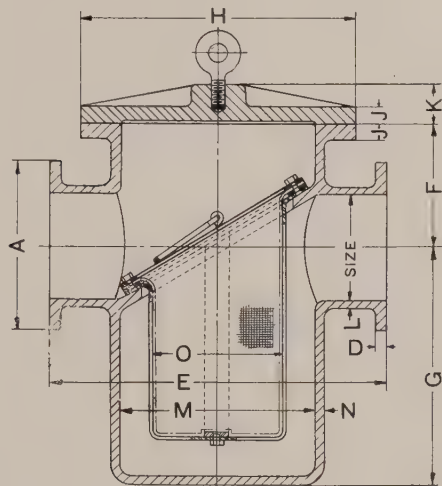


Fig. 147

Size...in.	3	4	5	6	8	10	12	14	16	18	20
A	7½	9	10	11	13½	16	19	21	23½	25	27½
D	¾	15/16	15/16	1	1⅛	1⅜	1¼	1⅜	1⅞	1⅞	1⅞
E	19	22	24	24	28	32	38	42	46	49	52
F	7½	8½	9	9	10½	12	14	17	18	19	20
G	14	16	18	18	23	25	27	30	32	34	36
H	16	19	21	21	25	27½	29½	36½	36½	43¾	46
J	1⅜	1¼	1⅜	1⅜	1⅞	1⅞	1⅞	2⅞	2⅞	2⅞	2⅞
K	2¼	2¾	3	3	3½	3½	4½	5½	5½	6½	6½
L	7/16	1½	1½	9/16	5/8	¾	13/16	7/8	1	1⅞	1⅞
M	10	12	14	14	18	20	22	28	28	34	36
N	¾	13/16	7/8	7/8	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞
O	7	8	10	10	12	15½	15½	21	21	26	26

For price list, see page 69.
For drilling, see page 383.

CAST IRON SLOTTED STRAINERS

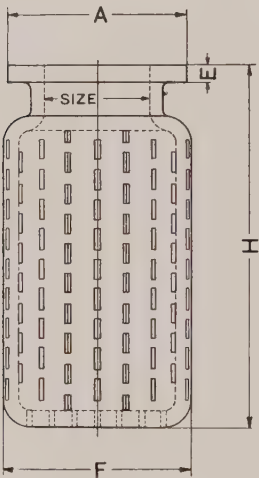


Fig. 148

Size . . in.	3	4	5	6	8	10	12	14	16	18	20
A	7½	9	10	11	13½	16	19	21	23½	25	27½
E	¾	15/16	15/16	1	1 1/8	1 3/16	1 ¼	1 3/8	1 7/16	1 9/16	1 11/16
F	5 1/8	7 ¼	9 ¼	9 ¼	14 ¼	15 ½	17 5/8	21 ½	21 ½	23 ½	27 5/8
H	9	10	16	16	24	24	25	28	32	38	45 ¾

For price list, see page 70.

For drilling, see page 383.

COPPER EXPANSION JOINTS FOR
EXHAUST STEAM

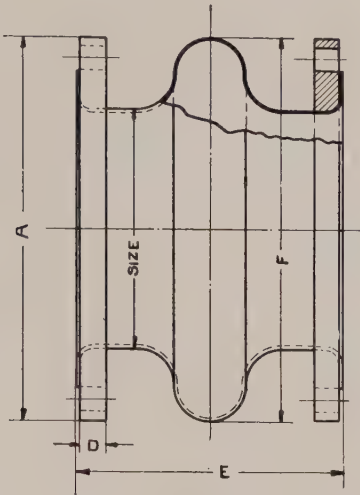


Fig. 144

Size . in.	8	9	10	12	14	15	16	18	20	22	24
A	13½	15	16	19	21	22¼	23½	25	27½	29½	32
D	1⅛	1⅛	1⅜	1¼	1⅜	1⅜	1⅞	1⅞	1⅞	1⅞	1⅞
E	11½	11½	12½	13	15	15	15½	16½	17	19	19
F	13½	15	16	19	21	22¼	23½	25	27½	29½	32
Size of Pipe Tap	½	¾	¾	¾	1	1	1	1	1	1¼	1¼

Size . in.	26	28	30	32	34	36	40	42	48	54	
A	34¼	36½	38¾	41¾	43¾	46	50¾	53	59½	66¼	....
D	2	2⅞	2⅞	2¼	2⅞	2⅞	2½	2⅞	2¾	3	....
E	20	20	21	21½	22½	22½	24	25	26½	26½	....
F	34¼	36½	38¾	41	43½	45¾	50	52¾	59½	66	....
Size of Pipe Tap	1¼	1¼	1¼	1¼	1½	1½	1½	1½	1½	1½	

For drilling, see page 383.
For price list, see page 71.
Expansion joints of this type are suitable for a limited amount expansion only, not more than ¼".
On account of crystallization they should be reannealed every two years.

GALVANIZED IRON EXHAUST HEADS

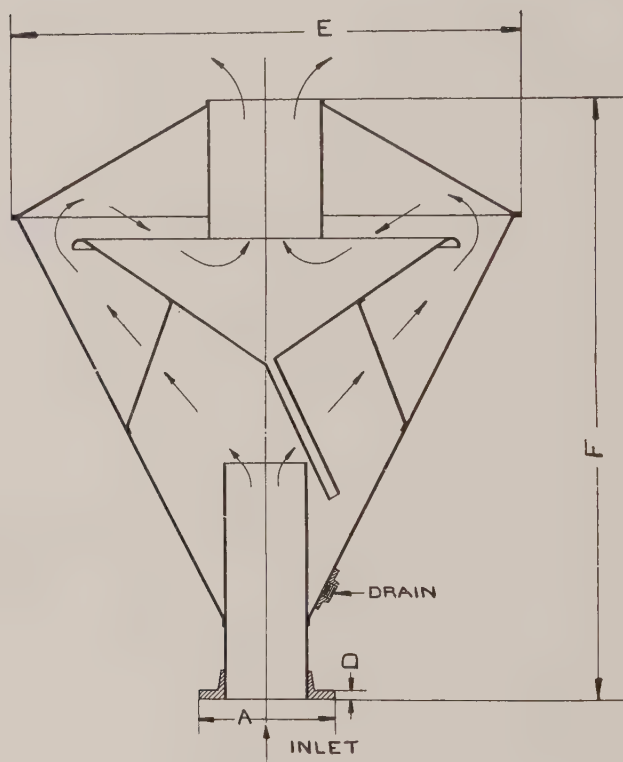


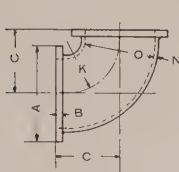
Fig. 145

Size..in.	6	8	10	12	14	16	18	20	22	24	26	28	30
A	11	13½	16	19	21	23½	25	27½	29½	32	34¼	36½	38¾
D	1	1⅛	1⅜	1¼	1⅜	1⅞	1⅞	1⅞	1⅞	1⅞	2	2⅜	2⅞
E	40	50	54	58	67	71	74	76	78	80	82	84	88
F	60	74	76	78	82	86	90	92	94	96	98	100	102

For drilling, see page 383.

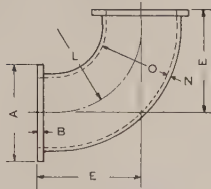
For price list, see page 72.

CAST IRON FLANGED FITTINGS
30 POUNDS WORKING PRESSURE



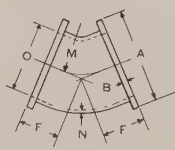
STD. ELBOW

Fig. 1005



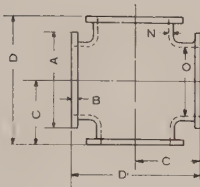
L. R. ELBOW

Fig. 1006



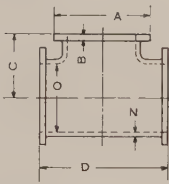
45° ELBOW

Fig. 1007



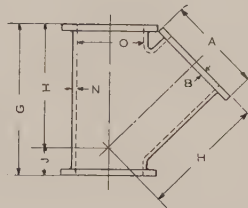
CROSS

Fig. 1008



TEE

Fig. 1009



LATERAL

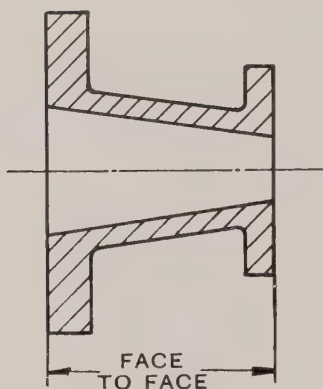
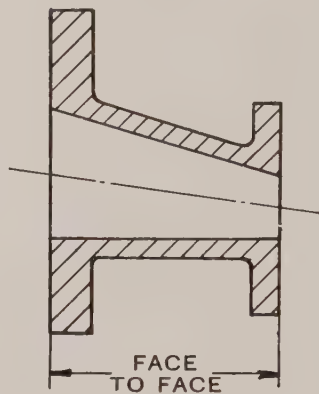
Fig. 1010

Size Inches	A	B	C	D	E	F	G	H	J	K	L	M	N	O
16	23 1/2	1 7/16	15	30	24	8	36 1/2	30	6 1/2	12 1/2	19 1/2	12 1/2	1 7/16	16
18	25	1 9/16	16 1/2	33	26 1/2	8 1/2	39	32	7	13 1/2	22	13 1/2	3/4	18
20	27 1/2	1 11/16	18	36	29	9 1/4	43	35	8	14 3/4	24	14 3/4	13/16	20
22	29 1/2	1 13/16	20	40	31 1/2	10	46	37 1/2	8 1/2	15 3/4	26 1/2	15 3/4	7/8	22
24	32	1 7/8	22	44	34	11	49 1/2	40 1/2	9	17	29	17	15/16	24
26	34 1/4	2	23	46	36 1/2	13	53	44	9	18 1/8	32	18 1/4	1	26
28	36 1/2	2 1/16	24	48	39	14	56	46 1/2	9 1/2	19 1/4	34 1/2	19 1/4	1 1/16	28
30	38 3/4	2 1/8	25	50	41 1/2	15	59	49	10	20	37	20 1/2	1 1/16	30
32	41 3/4	2 1/4	26	52	44	16	...	...	...	20 1/2	39 1/2	21 3/4	1 1/16	32
34	43 3/4	2 3/16	27	54	46 1/2	17	...	...	...	21 3/4	42	22 3/4	1 1/8	34
36	46	2 3/8	28	56	49	18	...	...	...	22 3/4	44 1/2	24	1 1/8	36
38	48 3/4	2 3/8	29	58	51 1/2	19	...	...	...	24	47	25	1 1/8	38
40	50 3/4	2 1/2	30	60	54	20	...	...	...	25	49 1/2	26 1/4	1 3/16	40
42	53	2 5/8	31	62	56 1/2	21	...	...	...	26 1/4	52	27 1/2	1 3/16	42
44	55 1/4	2 5/8	32	64	59	22	...	...	...	27	54 1/2	28	1 3/16	44
46	57 1/4	2 11/16	33	66	61 1/2	23	...	...	...	28	57	30	1 1/4	46
48	59 1/2	2 3/4	34	68	64	24	...	...	...	29 3/4	59 1/2	31	1 1/4	48
50	61 3/4	2 3/4	35	70	66 1/2	25	...	...	...	30	60 1/2	32	1 5/16	50
52	64	2 7/8	37	74	69	26	...	...	...	31	63	33	1 3/8	52
54	66 1/4	3	39	78	71 1/2	27	...	...	...	33	66	34 1/2	1 1/2	54

Dimensions of larger sizes, see page 403.
For drilling, see page 383.
For description, see page 22. For price list, see pages 73 to 76.
Dimensions of side outlet fittings are same as shown above.

CAST IRON FLANGED REDUCERS

30 POUNDS WORKING PRESSURE

Taper Reducer
Fig. 155Eccentric Reducer
Fig. 156

Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face
16 x 12	18	24 x 20	24	32 x 30	32	42 x 34	42
16 x 14	18	24 x 22	24	34 x 26	34	42 x 36	42
16 x 15	18	26 x 18	26	34 x 28	34	42 x 38	42
18 x 12	19	26 x 20	26	34 x 30	34	42 x 40	42
18 x 14	19	26 x 22	26	34 x 32	34	44 x 36	44
18 x 15	19	26 x 24	26	36 x 28	36	44 x 38	44
18 x 16	19	28 x 20	28	36 x 30	36	44 x 40	44
20 x 14	20	28 x 22	28	36 x 32	36	44 x 42	44
20 x 15	20	28 x 24	28	36 x 34	36	46 x 38	46
20 x 16	20	28 x 26	28	38 x 30	38	46 x 40	46
20 x 18	20	30 x 22	30	38 x 32	38	46 x 42	46
22 x 15	22	30 x 24	30	38 x 34	38	46 x 44	46
22 x 16	22	30 x 26	30	38 x 36	38	48 x 40	48
22 x 18	22	30 x 28	30	40 x 32	40	48 x 42	48
22 x 20	22	32 x 24	32	40 x 34	40	48 x 44	48
24 x 16	24	32 x 26	32	40 x 36	40	48 x 46	48
24 x 18	24	32 x 28	32	40 x 38	40	.....	..

Flanges are made to low pressure standard for 50 pounds.

For drilling, see page 383.

For price list, see page 77.

TEMPLATES FOR DRILLING

LOW PRESSURE STANDARD

FLANGED VALVES AND FITTINGS

Proposed Low Pressure Standard for 50 Pounds - December 1918

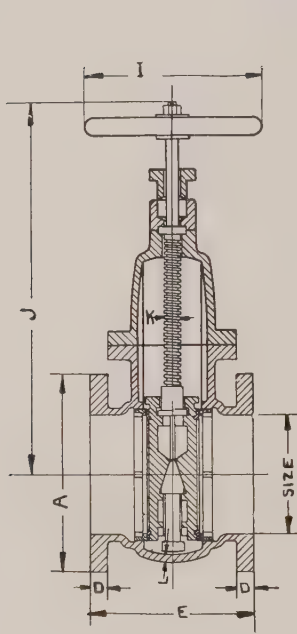
Size Inches	Diameter of Flanges	Thickness of Flanges	Bolt Circle	Number of Bolts	Size of Bolts	Length of Bolts	Length of Studs with 2 Nuts
12	19	1 $\frac{1}{4}$	17	12	$\frac{3}{4}$	3 $\frac{1}{2}$	
14	21	1 $\frac{3}{8}$	18 $\frac{3}{4}$	12	$\frac{3}{4}$	3 $\frac{3}{4}$	
15	22 $\frac{1}{4}$	1 $\frac{3}{8}$	20	16	$\frac{3}{4}$	3 $\frac{3}{4}$	
16	23 $\frac{1}{2}$	1 $\frac{1}{2}$	21 $\frac{1}{4}$	16	$\frac{3}{4}$	4	
18	25	1 $\frac{1}{2}$	22 $\frac{3}{4}$	16	$\frac{7}{8}$	4 $\frac{1}{4}$	
20	27 $\frac{1}{2}$	1 $\frac{11}{16}$	25	20	$\frac{7}{8}$	4 $\frac{1}{2}$	
22	29 $\frac{1}{2}$	1 $\frac{11}{16}$	27 $\frac{1}{4}$	20	$\frac{7}{8}$	4 $\frac{3}{4}$	
24	32	1 $\frac{7}{8}$	29 $\frac{1}{2}$	20	$\frac{7}{8}$	5	
26	34 $\frac{1}{4}$	2	31 $\frac{3}{4}$	24	1	5 $\frac{1}{4}$	
28	36 $\frac{1}{2}$	2 $\frac{1}{16}$	34	28	1	5 $\frac{1}{2}$	
30	38 $\frac{3}{4}$	2 $\frac{1}{8}$	36	28	1	5 $\frac{1}{2}$	
32	41 $\frac{3}{4}$	2 $\frac{1}{4}$	38 $\frac{1}{2}$	28	1	5 $\frac{3}{4}$	
34	43 $\frac{3}{4}$	2 $\frac{1}{4}$	40 $\frac{1}{2}$	32	1	6	
36	46	2 $\frac{3}{8}$	42 $\frac{3}{4}$	32	1	6	
38	48 $\frac{3}{4}$	2 $\frac{3}{8}$	45 $\frac{1}{4}$	32	1 $\frac{1}{8}$	6 $\frac{1}{4}$	7 $\frac{1}{2}$
40	50 $\frac{3}{4}$	2 $\frac{1}{2}$	47 $\frac{1}{4}$	36	1 $\frac{1}{8}$	6 $\frac{1}{2}$	7 $\frac{3}{4}$
42	53	2 $\frac{3}{8}$	49 $\frac{1}{2}$	36	1 $\frac{1}{8}$	6 $\frac{3}{4}$	8
44	55 $\frac{1}{4}$	2 $\frac{3}{8}$	51 $\frac{3}{4}$	40	1 $\frac{1}{8}$	6 $\frac{3}{4}$	8
46	57 $\frac{1}{4}$	2 $\frac{3}{8}$	53 $\frac{3}{4}$	40	1 $\frac{1}{8}$	6 $\frac{3}{4}$	8 $\frac{1}{4}$
48	59 $\frac{1}{2}$	2 $\frac{3}{4}$	56	44	1 $\frac{1}{8}$	7	8 $\frac{1}{4}$
50	61 $\frac{3}{4}$	2 $\frac{3}{4}$	58 $\frac{1}{4}$	44	1 $\frac{1}{8}$	7	8 $\frac{1}{4}$
52	64	2 $\frac{7}{8}$	60 $\frac{1}{2}$	44	1 $\frac{1}{8}$	7 $\frac{1}{4}$	8 $\frac{1}{2}$
54	66 $\frac{1}{4}$	3	62 $\frac{3}{4}$	44	1 $\frac{1}{8}$	7 $\frac{1}{2}$	8 $\frac{3}{4}$
56	68 $\frac{3}{4}$	3	65	48	1 $\frac{1}{4}$	7 $\frac{3}{4}$	9
58	71	3 $\frac{1}{8}$	67 $\frac{1}{4}$	48	1 $\frac{1}{4}$	8	9 $\frac{1}{2}$
60	73	3 $\frac{1}{8}$	69 $\frac{1}{4}$	52	1 $\frac{1}{4}$	8	9 $\frac{1}{2}$
62	75 $\frac{3}{4}$	3 $\frac{1}{4}$	71 $\frac{3}{4}$	52	1 $\frac{1}{4}$	8 $\frac{1}{4}$	9 $\frac{1}{2}$
64	78	3 $\frac{1}{4}$	74	52	1 $\frac{1}{4}$	8 $\frac{1}{4}$	9 $\frac{1}{2}$
66	80	3 $\frac{3}{8}$	76	52	1 $\frac{1}{4}$	8 $\frac{1}{2}$	10
68	82 $\frac{1}{4}$	3 $\frac{3}{8}$	78 $\frac{1}{4}$	56	1 $\frac{1}{4}$	8 $\frac{1}{2}$	10
70	84 $\frac{1}{2}$	3 $\frac{1}{2}$	80 $\frac{1}{2}$	56	1 $\frac{1}{4}$	8 $\frac{3}{4}$	10 $\frac{1}{4}$
72	86 $\frac{1}{2}$	3 $\frac{1}{2}$	82 $\frac{1}{2}$	60	1 $\frac{1}{4}$	8 $\frac{3}{4}$	10 $\frac{1}{4}$
74	88 $\frac{1}{2}$	3 $\frac{5}{8}$	84 $\frac{1}{2}$	60	1 $\frac{1}{4}$	9	10 $\frac{1}{2}$
76	90 $\frac{3}{4}$	3 $\frac{5}{8}$	86 $\frac{1}{2}$	60	1 $\frac{1}{4}$	9	10 $\frac{1}{2}$
78	93	3 $\frac{3}{4}$	88 $\frac{3}{4}$	60	1 $\frac{3}{8}$	9 $\frac{1}{4}$	11
80	95 $\frac{1}{4}$	3 $\frac{3}{4}$	91	60	1 $\frac{3}{8}$	9 $\frac{1}{4}$	11
82	97 $\frac{1}{2}$	3 $\frac{7}{8}$	93 $\frac{1}{4}$	60	1 $\frac{3}{8}$	9 $\frac{1}{2}$	11 $\frac{1}{4}$
84	99 $\frac{3}{4}$	3 $\frac{7}{8}$	95 $\frac{1}{2}$	64	1 $\frac{3}{8}$	9 $\frac{1}{2}$	11 $\frac{1}{4}$
86	102	4	97 $\frac{3}{4}$	64	1 $\frac{3}{8}$	10	11 $\frac{1}{2}$
88	104 $\frac{1}{4}$	4	100	68	1 $\frac{3}{8}$	10	11 $\frac{1}{2}$
90	106 $\frac{1}{2}$	4 $\frac{1}{8}$	102 $\frac{1}{4}$	68	1 $\frac{3}{8}$	10 $\frac{1}{4}$	11 $\frac{3}{4}$
92	108 $\frac{3}{4}$	4 $\frac{1}{8}$	104 $\frac{1}{2}$	68	1 $\frac{3}{8}$	10 $\frac{1}{4}$	11 $\frac{3}{4}$
94	111	4 $\frac{1}{4}$	106 $\frac{1}{2}$	68	1 $\frac{3}{8}$	10 $\frac{1}{2}$	12
96	113 $\frac{1}{4}$	4 $\frac{1}{4}$	108 $\frac{1}{2}$	68	1 $\frac{3}{8}$	10 $\frac{1}{2}$	12
98	115 $\frac{1}{2}$	4 $\frac{3}{8}$	110 $\frac{3}{4}$	68	1 $\frac{3}{8}$	10 $\frac{1}{2}$	12 $\frac{1}{4}$
100	117 $\frac{3}{4}$	4 $\frac{3}{8}$	113	68	1 $\frac{3}{8}$	10 $\frac{1}{2}$	12 $\frac{3}{4}$

Numbers of holes are in multiples of four, so that fittings may be made to face to any quarter. Bolt holes straddle center lines.

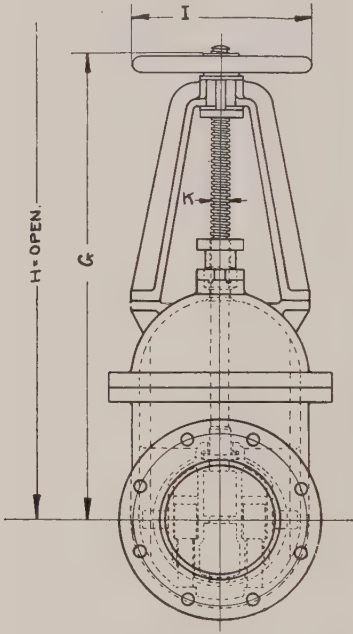
Bolt holes are drilled $\frac{1}{8}$ inch larger than nominal diameter of bolts.

STANDARD FLANGED GATE VALVES
No. 2 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.



Inside Screw
Fig. 231



Outside Screw and Yoke
Fig. 232

"O" = Number of turns to open

Size...inches	1½	2	2½	3	4	5	6	7	8	10	12	14
A	5	6	7	7½	9	10	11	12½	13½	16	19	21
D	5 9/16	6 5/8	7 11/16	8 3/4	9 9/16	10 1/8	11 1/16	12 1/8	13 1/8	16 1/8	19 1/4	21 1/8
E	6 1/2	7	7 1/2	8	9	10	10 1/2	11	11 1/2	13	14	15
G	12	12	13 1/4	15 3/4	18 1/4	21 1/2	24	28 3/4	31	37 3/4	44 7/8	50
H	14 5/8	14 3/8	16 5/8	19 1/2	23	27 3/8	30 7/8	36 3/4	40	48 3/4	58 3/8	65 1/2
I	6	6	6	7 1/2	7 1/2	9	9	12	12	15	18	18
J	11 1/2	11 1/2	12	13 3/4	15 3/8	18 1/4	19 3/4	23 1/2	25 1/8	28 3/4	33	35 7/8
K	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	1	1	1 1/8	1 1/8	1 1/4	1 1/2	1 1/2
L	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	1	1	1 1/8	1 1/8	1 1/4	1 1/2	1 1/2
O	11	14	17	20	26	22	26	30	34	21	25	29

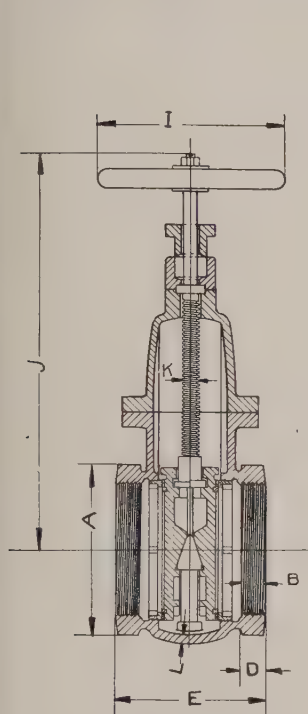
Size...inches	15	16	18	20	22	24	26	28	30	36	42	48
A	22 3/4	23 1/2	25	27 1/2	29 1/2	32	34 1/4	36 1/2	38 3/4	46	53	59 1/2
D	1 3/8	1 7/16	1 9/16	1 11/16	1 13/16	1 7/8	2	2 1/16	2 1/8	2 3/8	2 5/8	2 3/4
E	15	16	17	18	19	20	21 1/2	22 1/2	24	27	30 1/8	32
G	55 1/4	58	65 1/4	70 1/4	74	80 7/8	88 1/4	89 1/8	100 1/4	118	135 3/4	152 1/2
H	72	78 5/8	85 1/2	92 5/8	99 1/4	106 1/4	116 3/4	120	134 1/8	157	181 1/4	202
I	21	21	27	27	27	27	32	32	36	36	36	36
J	41 1/8	42 3/4	50 1/8	54	56 1/2	60 3/8	66	68 5/8	74 1/4	84 1/4	94 7/8	106
K	1 1/4	1 3/4	2	2	2	2	2 1/4	2 1/4	2 1/2	3	3 3/4	4
L	1 7/8	1	1 1/8	1 1/8	1 1/8	1 1/4	1 1/8	1 1/8	1 1/2	1 5/8	1 11/8	2
O	32	34	37	41	45	49	54	58	63	75	88	95

For drilling, see page 408. For description, see page 80. For price list, see pages 85 and 86.

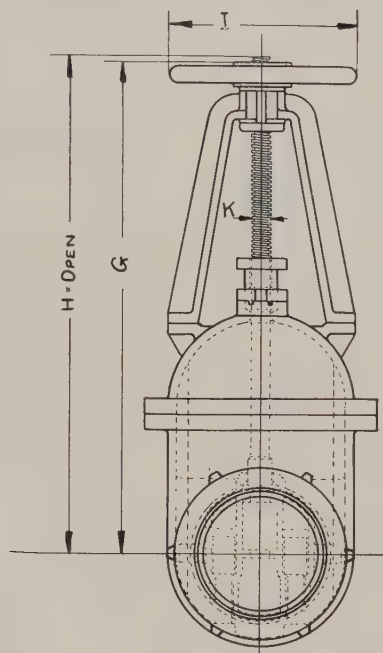
STANDARD SCREWED GATE VALVES

No. 2 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.



Inside Screw
Fig. 234



Outside Screw
Fig. 235

"O" = Number of turns to open

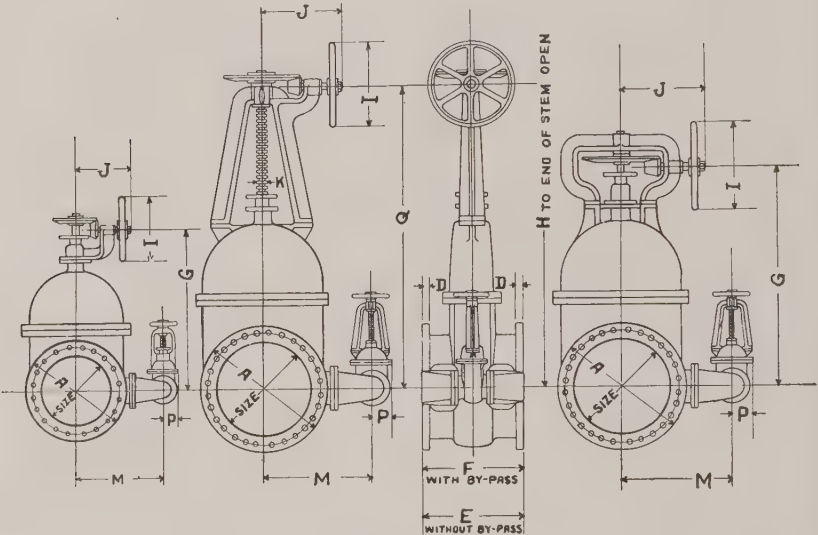
Size.....in.	2	2½	3	4	5	6	7	8	10	12
A	31½	41½	4¾	6	7½	8¾	9¾	10¾	13½	15¾
B	7/8	1	1	1⅛	1¼	1⅜	1½	1⅝	1¾	2
D	7/8	1	1	1⅛	1¼	1⅜	1½	1⅝	1¾	2
E	5¾	6½	7	7½	8	8	9	9½	10	12
G	12	13¾	15¾	18¼	21½	24	28¾	31	37¾	44⅞
H	14⅝	16⅝	19½	23	27¾	30⅞	36¾	40	48¾	58¾
I	6	6	7½	7½	9	9	12	12	15	18
J	11½	12	13¾	15⅝	18¼	19¾	23½	25⅞	28¾	33
K	¾	¾	7/8	7/8	1	1	1⅛	1⅛	1¼	1½
L	5/16	5/16	3/8	3/8	3/8	7/16	7/16	1/2	9/16	5/8
O	14	17	20	26	22	26	30	34	21	25

For price list, see pages 85 and 86.

For description, see page 80.

STANDARD FLANGED GATE VALVES
No. 2 P

BEVEL GEARED AND BY-PASSED
IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.



Inside Screw
Fig. 237

Outside Screw
Fig. 238

Inside Screw
Fig. 239

Gearing shown in Fig. 237 is used on sizes including 24-inch.
Gearing shown in Fig. 239 is used on sizes including 26-inch and above.
"L" = Thickness of metal. "N" = Size of By-pass. "O" = Number of turns to open.

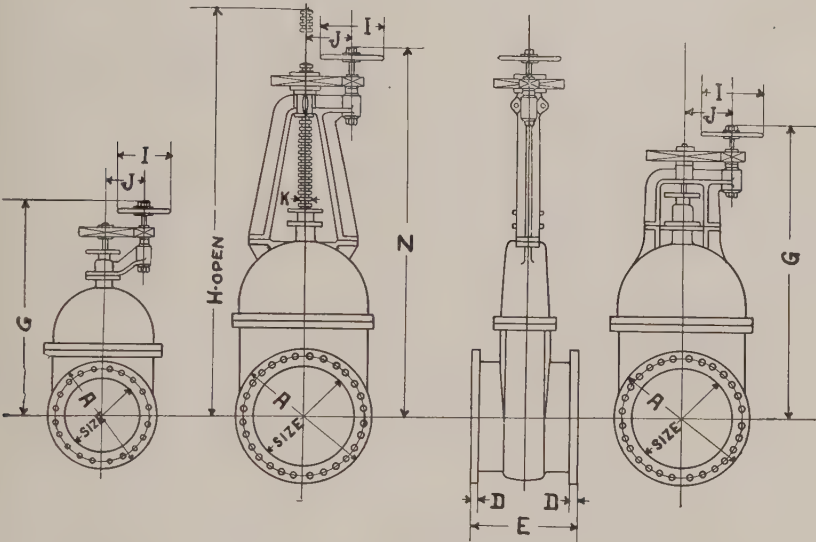
Size inches	10	12	14	15	16	18	20	22	24	26	28	30	36	42	48
A	16	19	21	22 ¹ / ₄	23 ¹ / ₂	25	27 ¹ / ₂	29 ¹ / ₂	32	34 ¹ / ₄	36 ¹ / ₂	38 ³ / ₄	46	53	59 ¹ / ₂
D	1 ³ / ₁₆	1 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ¹¹ / ₁₆	1 ¹³ / ₁₆	1 ⁷ / ₈	2	2 ¹ / ₁₆	2 ¹ / ₈	2 ⁵ / ₈	2 ⁵ / ₈	2 ³ / ₄
E	13	14	15	15	16	17	18	19	20	21 ¹ / ₂	22 ¹ / ₂	24	27	30 ¹ / ₂	32
F						26	27	28	29	30	31	32 ¹ / ₂	35	38	41 ¹ / ₂
G	25 ¹⁵ / ₁₆	30 ¹ / ₁₆	33	36 ⁷ / ₈	38 ⁵ / ₈	45 ⁷ / ₈	49	51 ¹ / ₂	55 ³ / ₈	60 ⁷ / ₈	63 ⁵ / ₈	68 ¹ / ₄	78 ¹ / ₄	88 ⁷ / ₈	98 ¹ / ₄
H	48 ³ / ₄	58 ³ / ₈	65 ¹ / ₂	72	78 ⁵ / ₈	85 ¹ / ₂	92 ⁵ / ₈	99 ¹ / ₄	107 ¹ / ₄	116 ³ / ₄	120	134 ⁵ / ₈	157	181 ¹ / ₄	202
I	15	15	15	18	18	21	21	21	21	27	27	32	32	32	32
J	14 ³ / ₄	14 ³ / ₄	14 ³ / ₄	16 ³ / ₄	16 ³ / ₄	17	17	17	17	21 ¹ / ₄	21 ¹ / ₄	21 ¹ / ₄	27 ³ / ₈	27 ³ / ₈	27 ³ / ₈
K	1 ¹ / ₄	1 ¹ / ₂	1 ¹ / ₂	1 ³ / ₄	1 ³ / ₄	2	2	2	2	2 ¹ / ₄	2 ¹ / ₄	2 ¹ / ₂	3	3 ¹ / ₄	4
L	⁹ / ₁₆	⁵ / ₈	³ / ₄	⁷ / ₈	1	1 ¹ / ₈	1 ¹ / ₈	1 ³ / ₁₆	1 ¹ / ₄	1 ⁵ / ₁₆	1 ³ / ₈	1 ¹ / ₂	1 ⁵ / ₈	1 ¹³ / ₁₆	2
M						24 ¹ / ₂	26	28 ¹ / ₄	29 ¹ / ₂	30 ¹ / ₄	31 ¹ / ₄	34	37 ¹ / ₂	40 ¹ / ₄	45 ⁷ / ₈
N						3	3	4	4	5	5	6	6	6	8
O	42	51	59	74	78	86	96	105	115	162	174	189	375	438	475
P						3 ¹⁵ / ₁₆	3 ¹⁵ / ₁₆	5	5	5 ³ / ₄	5 ³ / ₄	6 ¹ / ₂	6 ¹ / ₂	6 ¹ / ₂	8 ¹ / ₈
Q	36 ⁷ / ₁₆	43 ³ / ₈	48 ¹ / ₂	52 ⁵ / ₁₆	54 ¹⁵ / ₁₆	61 ¹⁵ / ₁₆	66 ¹⁵ / ₁₆	70 ¹¹ / ₁₆	77 ⁹ / ₁₆	84 ⁹ / ₁₆	86 ⁵ / ₁₆	96 ¹⁵ / ₁₆	112 ¹ / ₄	129 ³ / ₄	146 ¹ / ₄

For drilling, see page 408.
For price list, see pages 85 and 86.

For description, see page 80.

STANDARD FLANGED GATE VALVES
No. 2P

SPUR GEARED. IRON BODY. BRONZE MOUNTED.
PARALLEL SEAT.



Inside Screw
Fig. 240

Outside Screw
Fig. 241

Inside Screw
Fig. 242

Gearing shown in Fig. 240 is used on sizes including 24-inch. Gearing shown in Fig. 242 is used on sizes 26-inch and above.
"L" = Thickness of metal. "O" = Number of turns to open.

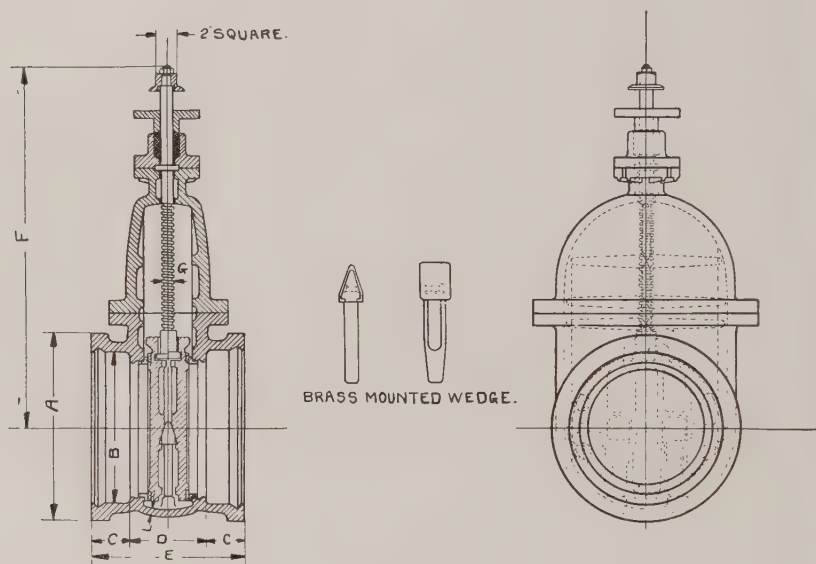
Size in.	10	12	14	15	16	18	20	22	24	26	28	30	36	42	48
A	16	19	21	22 ¹ / ₄	23 ¹ / ₂	25	27 ¹ / ₂	29 ¹ / ₂	32	34 ¹ / ₄	36 ¹ / ₂	38 ³ / ₄	46	53	59 ¹ / ₂
D	1 ³ / ₁₆	1 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ¹¹ / ₁₆	1 ¹³ / ₁₆	1 ⁷ / ₈	2	2 ¹ / ₁₆	2 ¹ / ₈	2 ³ / ₈	2 ⁵ / ₈	2 ³ / ₄
E	13	14	15	15	16	17	18	19	20	21 ¹ / ₂	22 ¹ / ₂	24	27	30 ¹ / ₂	32
G	35 ¹¹ / ₁₆	39 ⁵ / ₁₆	42 ⁷ / ₈	46 ³ / ₄	48 ¹ / ₂	55 ³ / ₄	58 ⁷ / ₈	61 ³ / ₈	65 ¹ / ₄	76 ³ / ₄	79 ¹ / ₂	84 ¹ / ₈	94 ¹ / ₈	104 ³ / ₄	117
H	48 ³ / ₄	58 ³ / ₈	65 ¹ / ₂	72	78 ⁵ / ₈	85 ¹ / ₂	92 ⁵ / ₈	99 ¹ / ₄	107 ¹ / ₄	116 ³ / ₄	120	134 ⁵ / ₈	157	181 ¹ / ₄	202
I	15	15	15	18	18	18	18	18	18	21	21	21	27	27	27
J	9	9	9	11	11	11	11	11	11	13 ¹ / ₂	13 ¹ / ₂	13 ¹ / ₂	16 ¹ / ₂	16 ¹ / ₂	18
K	1 ¹ / ₄	1 ¹ / ₂	1 ¹ / ₂	1 ³ / ₄	1 ³ / ₄	2	2	2	2	2 ¹ / ₄	2 ¹ / ₄	2 ¹ / ₂	3	3 ¹ / ₄	4
L	⁹ / ₁₆	⁵ / ₈	³ / ₄	⁷ / ₈	1	1 ¹ / ₈	1 ¹ / ₈	1 ³ / ₁₆	1 ¹ / ₄	1 ⁵ / ₁₆	1 ³ / ₈	1 ¹ / ₂	1 ⁵ / ₈	1 ³ / ₁₆	2
N	43 ⁷ / ₁₆	50 ³ / ₄	55 ⁷ / ₈	61 ¹ / ₄	63 ⁷ / ₈	70 ⁷ / ₈	75 ⁷ / ₈	79 ⁵ / ₈	86 ¹ / ₂	93 ⁵ / ₈	95 ³ / ₈	105 ⁵ / ₈	123 ⁵ / ₈	141	159
O	42	51	59	84	89	99	109	120	131	189	203	221	375	438	475

For drilling, see page 408.
For price list, see pages 85 and 86.

STANDARD HUB END GATE VALVES

No. 2 P

IRON BODY BRONZE MOUNTED. PARALLEL SEAT.



Inside Screw

Fig. 233

"H" = Number of turns to open

Size. in.	3	4	5	6	7	8	10	12	14	15	16	18	20	24	30	36
A	7	7 $\frac{7}{8}$	9 $\frac{1}{4}$	10 $\frac{3}{8}$	11 $\frac{1}{2}$	12 $\frac{1}{2}$	14 $\frac{3}{4}$	17 $\frac{1}{4}$	19 $\frac{5}{8}$	20 $\frac{3}{4}$	21 $\frac{3}{4}$	23 $\frac{7}{8}$	26 $\frac{1}{4}$	30 $\frac{5}{8}$	37 $\frac{1}{2}$	44 $\frac{1}{2}$
B	4 $\frac{3}{4}$	5 $\frac{3}{4}$	6 $\frac{7}{8}$	8	9	10	12 $\frac{1}{8}$	14 $\frac{1}{4}$	16 $\frac{3}{8}$	17 $\frac{3}{8}$	18 $\frac{1}{2}$	20 $\frac{5}{8}$	22 $\frac{3}{4}$	27	33 $\frac{3}{8}$	39 $\frac{3}{4}$
C	3	3	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	4	4	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	5	5	5
D	4 $\frac{5}{8}$	4 $\frac{7}{8}$	5	5	5 $\frac{3}{4}$	5 $\frac{7}{8}$	5 $\frac{7}{8}$	6 $\frac{3}{4}$	7	7 $\frac{1}{2}$	7 $\frac{1}{2}$	9 $\frac{3}{4}$	10	11	14	15 $\frac{1}{2}$
E	10 $\frac{5}{8}$	10 $\frac{7}{8}$	12	12	12 $\frac{3}{4}$	13 $\frac{7}{8}$	13 $\frac{7}{8}$	15 $\frac{3}{4}$	16	16 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{3}{4}$	19	21	24	25 $\frac{1}{2}$
F	13 $\frac{3}{4}$	15 $\frac{5}{8}$	18 $\frac{1}{4}$	19 $\frac{3}{4}$	23 $\frac{1}{2}$	25 $\frac{1}{8}$	28 $\frac{3}{4}$	33	35 $\frac{7}{8}$	41 $\frac{1}{8}$	42 $\frac{3}{4}$	50 $\frac{1}{8}$	54	60 $\frac{3}{8}$	74 $\frac{1}{4}$	84 $\frac{1}{4}$
G	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2	2	2	2 $\frac{1}{2}$	3
H	20	26	22	26	30	34	21	25	29	32	34	37	41	49	63	75

For description, see page 80.

For price list, see page 87.

STANDARD FLANGED QUICK OPENING
GATE VALVES No. 2 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.

WORKING PRESSURES	
Sizes	Working Pressures
4 inch and smaller	125 pounds
5 inch to 8 inch inclusive	50 pounds
10 inch and 12 inch	15 pounds
14 inch to 16 inch inclusive	10 pounds

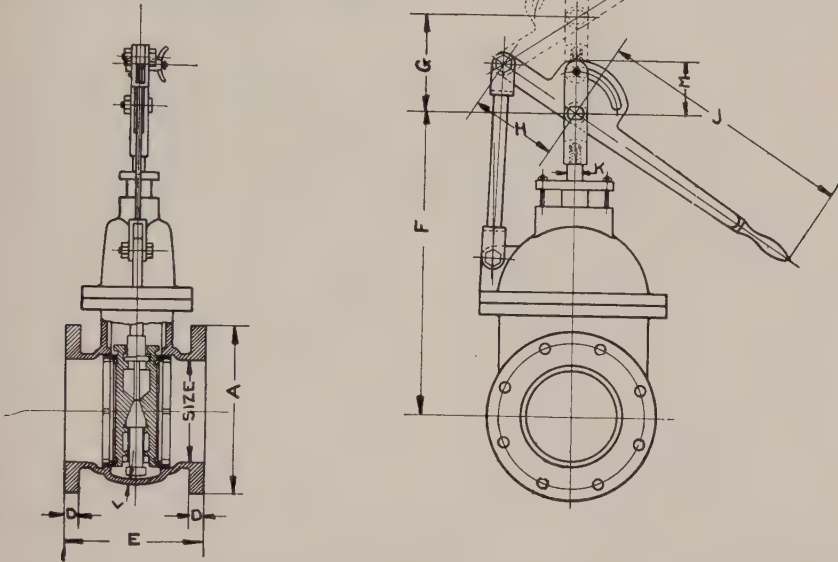


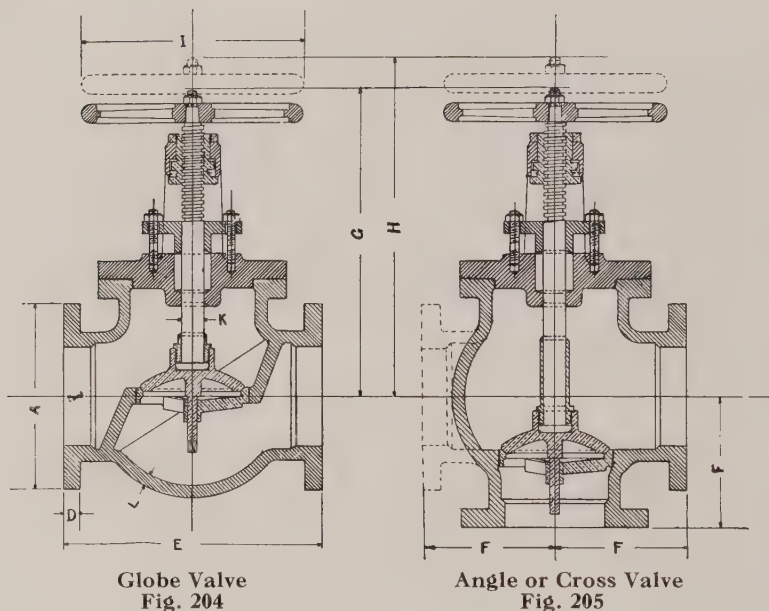
Fig. 236

Size in.	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6	7	7½	9	10	11	12½	13½	16	19	21	22¼	23½
D	5⅝	11⅞	3¼	15⅞	15⅞	1	1⅞	1⅞	1⅞	1¼	1⅞	1⅞	1⅞
E	7	7½	8	9	10	10½	11	11½	13	14	15	15	16
F	9¾	10½	12⅞	14½	17⅞	18⅞	22½	23½	28⅞	34⅞	37½	43½	45¼
G	2⅞	2⅞	3⅞	4⅞	5⅞	6⅞	7⅞	8⅞	10½	12¼	14¼	15¼	16¼
H	2⅞	3⅞	3⅞	4⅞	5¼	5¼	6⅞	7	8	9¾	11⅞	11⅞	13⅞
J	10	12	15	15	21	21	24	28	28	32	36	40	42
K	¾	¾	7⅞	7⅞	1	1	1⅞	1⅞	1¼	1½	1½	1¼	1¼
L	5⅞	5⅞	3⅞	3⅞	3⅞	7⅞	7⅞	1½	9⅞	5⅞	3¼	7⅞	1
M	1⅞	1⅞	2⅞	2⅞	3¼	3¼	4¼	4¼	5	5½	5½	7½	7½

For drilling, see page 408.
For price list, see page 88.
These valves are tested to 250 pounds pressure per square inch, but we recommend them for the pressure as listed above for easy operation with a pull of 75 pounds with the lever as furnished.

FLANGED GLOBE, ANGLE AND CROSS VALVES

125 POUNDS WORKING PRESSURE



Globe Valve
Fig. 204

Angle or Cross Valve
Fig. 205

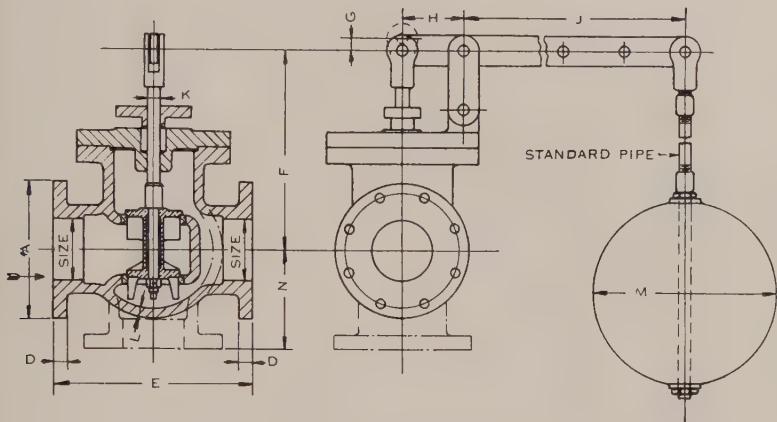
"O" = Number of turns to open

Size in.	6	7	8	10	12	14	15	16
A	11	12½	13½	16	19	21	22¼	23½
D	1	1⅛	1⅛	1⅜	1¼	1⅜	1⅜	1⅞
E	17	20	21	25	27	30	32	34½
F	8½	10	10½	12½	13½	15	16	17¼
G	20⅝	23	25	30	32¼	33½	36	36¾
H	22⅜	25	27¼	32¾	35½	37¼	40	41
I	12	12	15	18	21	21	27	27
K	1¼	1¼	1½	1¾	2	2	2¼	2¼
L	⅝	⅞	⅞	7⁄8	1	1	1⅛	1⅛
O	7	8	9	11	13	15	16	17

For drilling, see page 408.

For price list, see page 90.

FLANGED FLOAT VALVES
IRON BODY - BRONZE MOUNTED
OPEN TANK SERVICE



Globe Type Fig. 2012
Angle Type Fig. 2013

Size Inches	2	2½	3	4	5	6	7	8	10	12
A	6	7	7½	9	10	11	12½	13½	16	19
D	5/8	11/16	3/4	15/16	1	1 1/16	1 1/8	1 3/16	1 3/8	1 1/2
E	9	10½	11	13	14½	17	20	21	25	27
F	10¼	11½	12	13¾	14 5/8	15¾	16 5/8	18¼	20¾	22½
G	1½	9/16	11/16	7/8	1¼	1 1/16	1 9/16	1 11/16	1 15/16	2 1/16
H	2¾	2 7/8	3 1/16	4	4 7/8	5	5¾	6¾	7½	8½
J	19¼	20 1/8	22¾	26	31¾	35	38¼	40¼	45	51
K	5/8	5/8	3/4	7/8	7/8	1	1 1/8	1¼	1¼	1¼
L	1½	1½	9/16	5/8	5/8	5/8	1 1/16	1 1/8	1 1/8	1
M	8	10	10	12	12	14	14	14	16	16
N	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½

For drilling, see page 408.
For price list, see page 92.
When ordering state whether globe or angle type is desired.
These valves furnished with positive shut-off screw, when so ordered, at an extra charge.

FLANGED IRON BODY GLOBE SWING
CHECK VALVES

300 POUNDS TEST

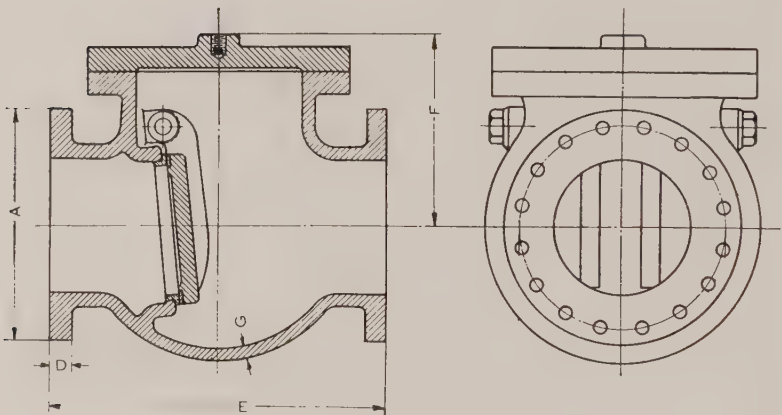


Fig. 337

Size In.	6	7	8	10	12	14	15	16	18	20	24
A	11	12½	13½	16	19	21	22¼	23½	25	27½	32
D	1	1⅛	1⅛	1⅜	1¼	1⅜	1⅜	1⅞	1⅞	1⅞	1⅞
E	17	20	21	25	27	30	32	34½	37	43	45
F	10⅛	10½	11¾	13⅞	16¼	17⅞	18	18⅛	19½	22½	24⅞
G	⅝	⅞	⅞	⅞	1	1	1⅞	1⅞	1⅞	1⅞	1¼

For drilling, see page 408.

For price list, see page 94.

BRONZE TUYERE COCKS, ATWOOD
PATTERN

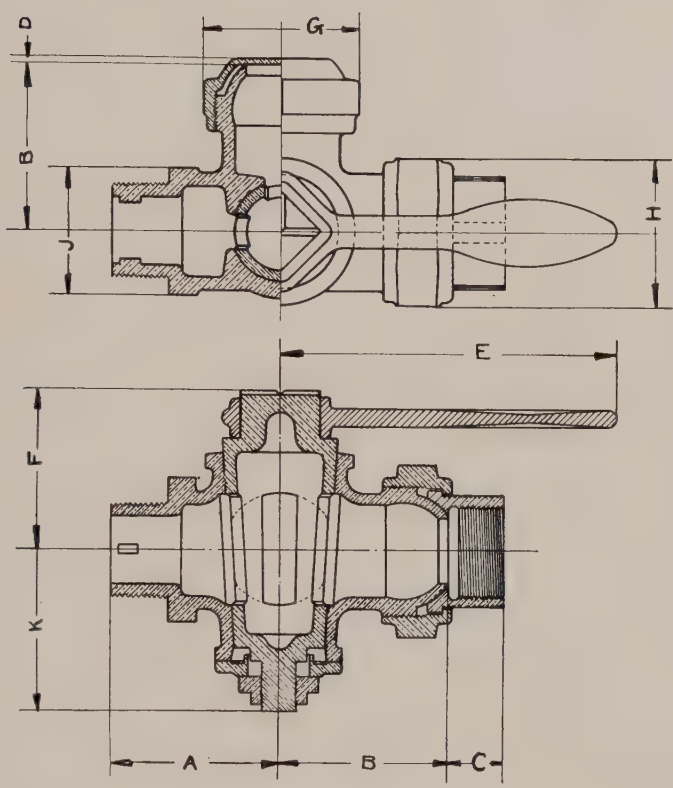


Fig. 2020

Size Inches	A	B	C	D	E	F	G	J	K
1¼	3	3	1	1⁄8	6	2⅞	2⅝	2⅜	2⅞
1½	3⅞	3	1	3⁄16	8	3⅜	3	2⅝	3⅜

NOTE.—“Best” Tuyere Cock No. 11 same as “Atwood” Pattern shown above. For “Best” Tuyere Cock No. 6, see page 395.

The above cut shows a right hand cock; i. e., the side outlet is on the right when the male end is upward and the wrench toward the operator. Unless specified otherwise all orders will be filled “right hand.”

For price list, see page 96.

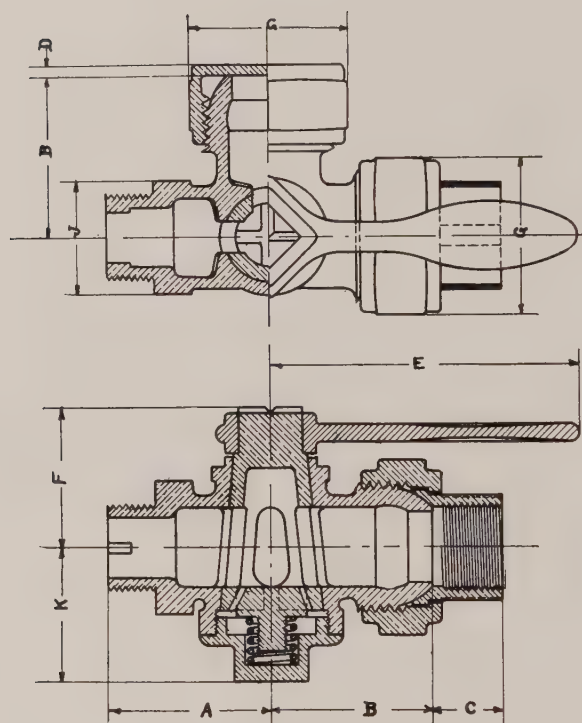
BRONZE TUYERE COCKS, SNYDER'S
PATENT

Fig. 2021

Size Inches	A	B	C	D	E	F	G	J	K
1¼	3	3	1	⅛	5¾	2⅝	2⅝	2⅜	2½
1½	3⅜	3⅜	1	⅜	8	2⅞	3	2½	3⅜

The above cut shows a right hand cock; i. e., the side outlet is on the right when the male end is upward and the handle toward the operator. Unless specified otherwise, all orders will be filled "right hand".

For price list, see page 97.

BRONZE TUYERE COCKS
BEST PATTERN No. 6

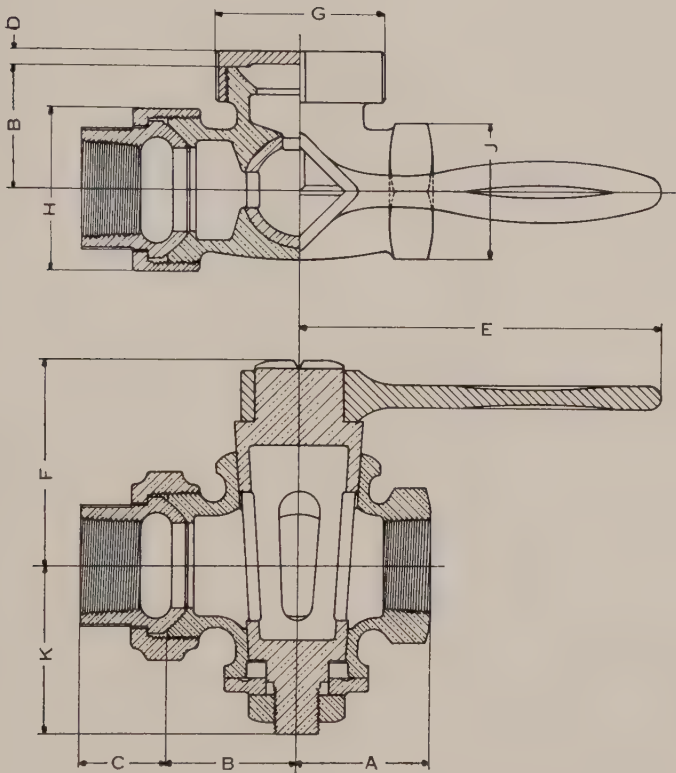


Fig. 2022

Size Inches	A	B	C	D	E	F	G	H	J	K
1	1 ⁷ / ₈	1 ⁷ / ₈	1 ¹ / ₄	³ / ₁₆	3 ¹ / ₂	2 ¹ / ₂	2 ⁷ / ₁₆	2 ⁵ / ₁₆	1 ⁷ / ₈	2
1 ¹ / ₄	2 ¹ / ₈	2 ¹ / ₈	1 ³ / ₈	¹ / ₄	5 ³ / ₁₆	3 ¹ / ₄	2 ¹¹ / ₁₆	2 ⁵ / ₈	2 ³ / ₁₆	2 ³ / ₄

For price list, see page 97.

"BEST" Tuyere Cock No. 11 same as "ATWOOD" Pattern, see page 393.

The above cut shows a right hand cock, i. e., the side outlet is on the right when the male end is upward and the handle toward the operator. Unless specified otherwise, all orders will be filled "right hand."

UNBALANCED EXPANSION JOINTS
125 POUNDS WORKING STEAM PRESSURE

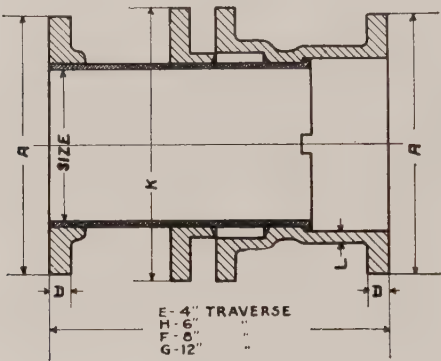


Fig. 244

Size inches	2	2½	3	4	5	6	7	8	10	12	14	15	16	18
A	6	7	7½	9	10	11	12½	13½	16	19	21	22¼	23½	25
D	5⁄8	11⁄16	¾	15⁄16	15⁄16	1	1 1⁄16	1 1⁄8	1 3⁄16	1 ¼	1 3⁄8	1 3⁄8	1 7⁄16	1 9⁄16
E	14	14	15	16	16	17	17¾	17¾	18½	18½	19½	20	20	20¾
F	22	22	23	24	24	25	25¾	25¾	26½	26½	27½	28	28	28¾
G	30	30	31	32	32	33	33¾	33¾	34½	34½	35½	36	36	36¾
H	18	18	19	20	20	21	21¾	21¾	22½	22½	23½	24	24	24¾
K	7¼	7¾	8½	9½	10¾	12¼	13¼	14¼	17	19¼	20½	21½	22½	25
L	7⁄16	7⁄16	1⁄2	1⁄2	9⁄16	5⁄8	5⁄8	5⁄8	11⁄16	¾	13⁄16	13⁄16	7⁄8	7⁄8

For drilling, see page 408.
For price list, see page 99.

BRONZE UNIVERSAL UNIONS
125 POUNDS WORKING STEAM PRESSURE

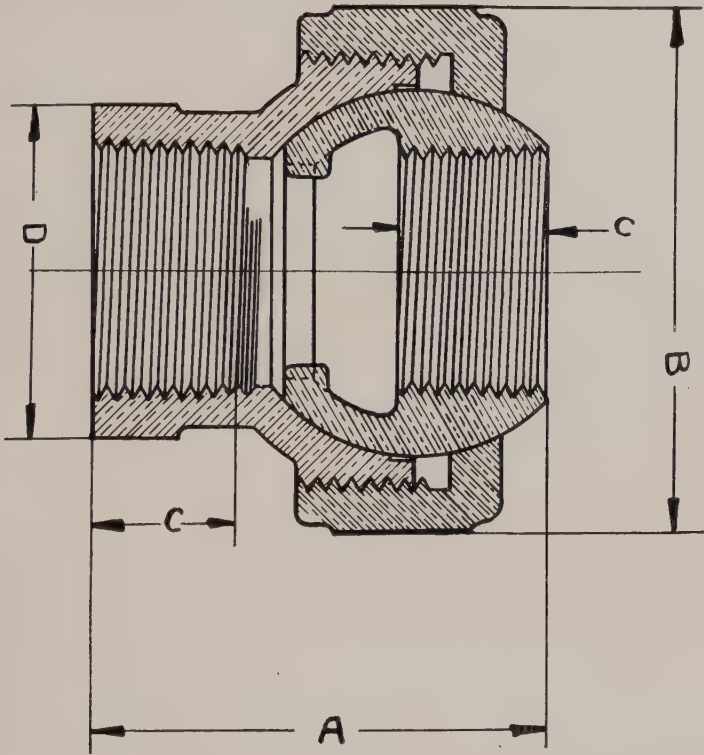


Fig. 2023

Size..... inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
A	$1\frac{13}{16}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{13}{16}$	$2\frac{7}{8}$	$3\frac{3}{16}$	$3\frac{13}{16}$	$3\frac{15}{16}$
B	2	$2\frac{1}{8}$	$2\frac{1}{2}$	$3\frac{1}{16}$	$3\frac{3}{8}$	$4\frac{1}{4}$	$4\frac{3}{4}$	$5\frac{3}{4}$
C	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{7}{8}$	$\frac{15}{16}$
D	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{7}{16}$	$2\frac{15}{16}$	$3\frac{1}{2}$	$4\frac{1}{8}$

For price list, see page 96.

TUYERE COCK UNIONS—BRONZE
ATWOOD PATTERN

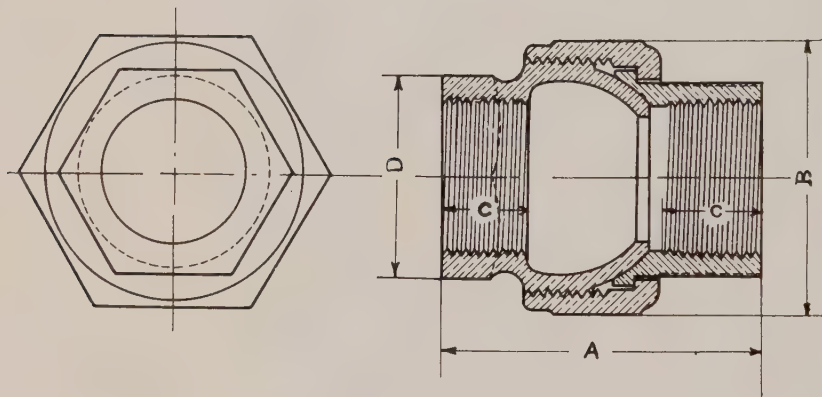


Fig. 2030

Size	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	2	$2\frac{3}{8}$	$2\frac{11}{16}$	$2\frac{7}{8}$	$2\frac{15}{16}$	$3\frac{1}{8}$
B	$1\frac{5}{8}$	2	$2\frac{5}{16}$	$2\frac{5}{8}$	3	$3\frac{5}{8}$
C	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{13}{16}$
D	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{7}{16}$	$2\frac{15}{16}$

For price list, see page 96.

The parts on these unions are interchangeable with the corresponding parts on the Tuyere Cocks.

See page 393 for dimensions of Tuyere Cock.

TUYERE COCK UNIONS—BRONZE
SNYDER PATTERN

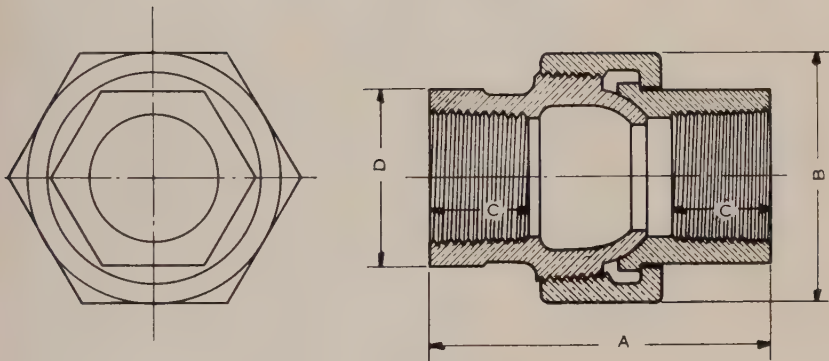


Fig. 2031

Size	1¼	1½
A	3⅞	3
B	2⅞	3
C	¾	⅞
D	2	2⅞

For price list, see page 97.
The parts on these unions are interchangeable with the corresponding parts on the Tuiere Cocks. See page 394 for dimensions of Tuiere Cock.

TUYERE COCK UNIONS—BRONZE
BEST PATTERN

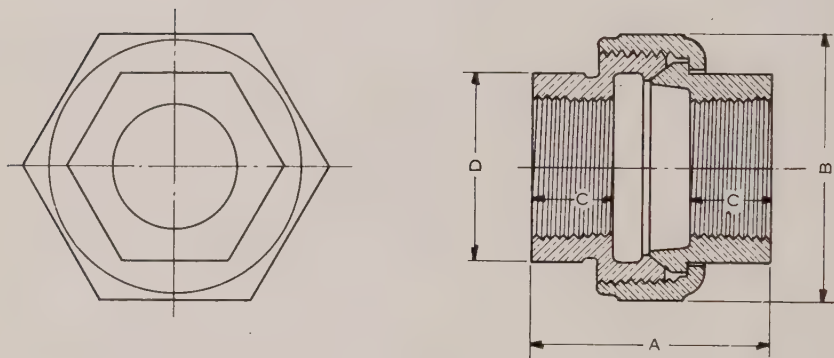


Fig. 2032

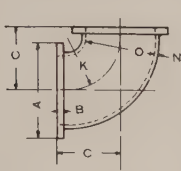
Size	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	$1\frac{31}{32}$	$2\frac{1}{4}$	$2\frac{9}{16}$	$2\frac{15}{16}$	$3\frac{1}{2}$	$3\frac{9}{16}$
B	$1\frac{9}{16}$	$1\frac{15}{16}$	$2\frac{5}{16}$	$2\frac{5}{8}$	$3\frac{1}{16}$	$3\frac{11}{16}$
C	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{3}{8}$	$\frac{7}{8}$
D	$[1\frac{3}{32}]$	$1\frac{7}{16}$	$1\frac{13}{16}$	$2\frac{3}{16}$	$2\frac{7}{16}$	3

For price list, see page 97.

The parts on these unions are interchangeable with the corresponding parts on the Tuyere Cocks.

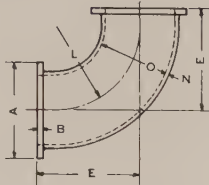
See page 395 for dimensions of Tuyere Cock.

CAST IRON FLANGED FITTINGS
125 POUNDS WORKING STEAM PRESSURE



STD. ELBOW

Fig. 2014



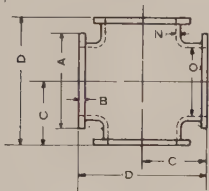
L. R. ELBOW

Fig. 2015



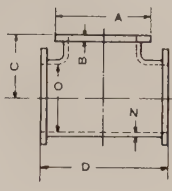
45° ELBOW

Fig. 2016



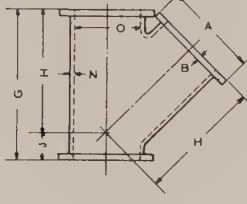
CROSS

Fig. 2017



TEE

Fig. 2018



LATERAL

Fig. 2019

Size In.	A	B	C	D	E	F	G	H	J	K	L	M	N	O
1	4	$\frac{7}{16}$	$3\frac{1}{2}$	7	5	$1\frac{3}{4}$	$7\frac{1}{2}$	$5\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{1}{2}$	3	2	$\frac{7}{16}$	1
$1\frac{1}{4}$	$4\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{4}$	$7\frac{1}{2}$	$5\frac{1}{2}$	2	8	$6\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{4}$	$\frac{7}{16}$	$1\frac{1}{4}$
$1\frac{1}{2}$	5	$\frac{9}{16}$	4	8	6	$2\frac{1}{4}$	9	7	2	3	4	$2\frac{3}{4}$	$\frac{7}{16}$	$1\frac{1}{2}$
2	6	$\frac{5}{8}$	$4\frac{1}{2}$	9	$6\frac{1}{2}$	$2\frac{1}{2}$	$10\frac{1}{2}$	8	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{4}$	$\frac{7}{16}$	2
$2\frac{1}{2}$	7	$\frac{11}{16}$	5	10	7	3	12	$9\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{3}{4}$	$4\frac{5}{8}$	$3\frac{3}{4}$	$\frac{7}{16}$	$2\frac{1}{2}$
3	$7\frac{1}{2}$	$\frac{3}{4}$	$5\frac{1}{2}$	11	$7\frac{3}{4}$	3	13	10	3	$4\frac{1}{8}$	$5\frac{1}{4}$	$4\frac{1}{8}$	$\frac{7}{16}$	3
$3\frac{1}{2}$	$8\frac{1}{2}$	$\frac{9}{16}$	6	12	$8\frac{1}{2}$	$3\frac{1}{2}$	$14\frac{1}{2}$	$11\frac{1}{2}$	3	$4\frac{1}{2}$	6	$4\frac{1}{2}$	$\frac{7}{16}$	$3\frac{1}{2}$
4	9	$\frac{15}{16}$	$6\frac{1}{2}$	13	9	4	15	12	3	5	$6\frac{1}{4}$	5	$\frac{1}{2}$	4
$4\frac{1}{2}$	$9\frac{1}{4}$	$\frac{15}{16}$	7	14	$9\frac{1}{2}$	4	$15\frac{1}{2}$	$12\frac{1}{2}$	3	$5\frac{1}{4}$	$6\frac{3}{4}$	$5\frac{1}{4}$	$\frac{1}{2}$	$4\frac{1}{2}$
5	10	$\frac{15}{16}$	$7\frac{1}{2}$	15	$10\frac{1}{4}$	$4\frac{1}{2}$	17	$13\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	5
6	11	1	8	16	$11\frac{1}{2}$	5	18	$14\frac{1}{2}$	$3\frac{1}{2}$	$6\frac{1}{4}$	$8\frac{1}{2}$	$6\frac{1}{4}$	$\frac{9}{16}$	6
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$8\frac{1}{2}$	17	$12\frac{3}{4}$	$5\frac{1}{2}$	$20\frac{1}{2}$	$16\frac{1}{2}$	4	7	$9\frac{3}{4}$	7	$\frac{5}{8}$	7
8	$13\frac{1}{2}$	$1\frac{1}{8}$	9	18	14	$5\frac{1}{2}$	22	$17\frac{1}{2}$	$4\frac{1}{2}$	$7\frac{1}{2}$	$10\frac{1}{2}$	$7\frac{1}{2}$	$\frac{5}{8}$	8
9	15	$1\frac{1}{8}$	10	20	$15\frac{1}{4}$	6	24	$19\frac{1}{2}$	$4\frac{1}{2}$	8	$11\frac{1}{2}$	8	$\frac{11}{16}$	9
10	16	$1\frac{3}{16}$	11	22	$16\frac{1}{2}$	$6\frac{1}{2}$	$25\frac{1}{2}$	$20\frac{1}{2}$	5	$8\frac{3}{4}$	$12\frac{1}{4}$	$8\frac{3}{4}$	$\frac{3}{4}$	10
12	19	$1\frac{1}{4}$	12	24	19	$7\frac{1}{2}$	30	$24\frac{1}{2}$	$5\frac{1}{2}$	10	15	10	$\frac{13}{16}$	12
14	21	$1\frac{3}{8}$	14	28	$21\frac{1}{2}$	$7\frac{1}{2}$	33	27	6	$11\frac{1}{4}$	17	$11\frac{1}{4}$	$\frac{7}{8}$	14

For dimensions of larger sizes, see page 402 and 403.

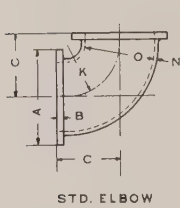
For drilling, see page 408.

For description, see page 22.

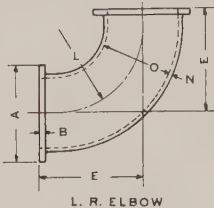
For price list, see pages 100 to 107.

Dimensions of side outlet fittings are same as shown above.

CAST IRON FLANGED FITTINGS
125 POUNDS WORKING STEAM PRESSURE



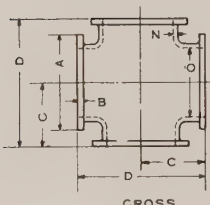
STD. ELBOW
Fig. 2024



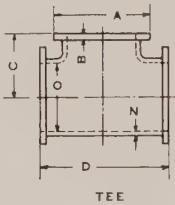
L. R. ELBOW
Fig. 2025



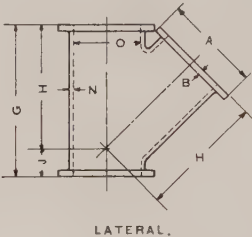
45° ELBOW
Fig. 2026



CROSS
Fig. 2027



TEE
Fig. 2028



LATERAL.
Fig. 2029

Size In.	A	B	C	D	E	F	G	H	J	K	L	M	N	O
15	22 ³ / ₄	1 ³ / ₈	14 ¹ / ₂	29	22 ³ / ₄	8	34 ¹ / ₂	28 ¹ / ₂	6	11 ³ / ₄	18 ¹ / ₂	11 ³ / ₄	7 ⁷ / ₈	15
16	23 ¹ / ₂	1 ⁷ / ₁₆	15	30	24	8	36 ¹ / ₂	30	6 ¹ / ₂	12 ¹ / ₂	19 ¹ / ₂	12 ¹ / ₂	1	16
18	25	1 ⁹ / ₁₆	16 ¹ / ₂	33	26 ¹ / ₂	8 ¹ / ₂	39	32	7	13 ¹ / ₂	22	13 ¹ / ₂	1 ¹ / ₁₆	18
20	27 ¹ / ₂	1 ¹¹ / ₁₆	18	36	29	9 ¹ / ₂	43	35	8	14 ³ / ₄	24	14 ³ / ₄	1 ¹ / ₈	20
22	29 ¹ / ₂	1 ³ / ₈	20	40	31 ¹ / ₂	10	46	37 ¹ / ₂	8 ¹ / ₂	15 ³ / ₄	26 ¹ / ₂	15 ³ / ₄	1 ³ / ₁₆	22
24	32	1 ⁷ / ₈	22	44	34	11	49 ¹ / ₂	40 ¹ / ₂	9	17	29	17	1 ¹ / ₄	24
26	34 ¹ / ₄	2	23	46	36 ¹ / ₂	13	53	44	9	18 ¹ / ₈	32	18 ¹ / ₄	1 ⁵ / ₁₆	26
28	36 ¹ / ₂	2 ¹ / ₁₆	24	48	39	14	56	46 ¹ / ₂	9 ¹ / ₂	19 ¹ / ₄	34 ¹ / ₂	19 ¹ / ₄	1 ³ / ₈	28
30	38 ³ / ₄	2 ¹ / ₈	25	50	41 ¹ / ₂	15	59	49	10	20	37	20 ¹ / ₂	1 ⁷ / ₁₆	30
32	41 ³ / ₄	2 ¹ / ₄	26	52	44	16	.....	.....	.....	20 ¹ / ₂	39 ¹ / ₂	21 ³ / ₄	1 ¹ / ₂	32
34	43 ³ / ₄	2 ⁵ / ₁₆	27	54	46 ¹ / ₂	17	.....	.....	.....	21 ³ / ₄	42	22 ³ / ₄	1 ⁹ / ₁₆	34
36	46	2 ³ / ₈	28	56	49	18	.....	.....	.....	22 ³ / ₄	44 ¹ / ₂	24	1 ⁵ / ₈	36
40	50 ³ / ₄	2 ¹ / ₂	30	60	54	20	.....	.....	.....	25	49 ¹ / ₂	26 ¹ / ₄	1 ³ / ₄	40
42	53	2 ⁵ / ₈	31	62	56 ¹ / ₂	21	.....	.....	.....	26 ¹ / ₄	52	27 ¹ / ₂	1 ¹³ / ₁₆	42
48	59 ¹ / ₂	2 ³ / ₄	34	68	64	24	.....	.....	.....	29 ³ / ₄	59 ¹ / ₂	31	2	48
54	66 ¹ / ₄	3	39	78	71 ¹ / ₂	27	.....	.....	.....	33	66	34 ¹ / ₂	2 ³ / ₁₆	54

For dimensions of smaller sizes, see page 401.
For dimensions of larger sizes, see page 403.
For drilling, see page 408.
For description, see page 22.
For price list, see pages 100 to 107.
Dimensions of side outlet fittings are same as shown above.

LOW PRESSURE AND STANDARD FLANGED FITTINGS

LARGE STRAIGHT SIZES

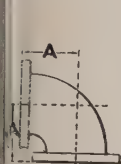


Fig. 285
90° Elbow

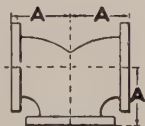


Fig. 286
Double Branch
Elbow

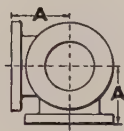


Fig. 287
Side Outlet
Elbow

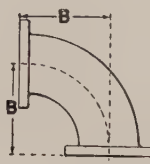


Fig. 288
Long Radius
Elbow



Fig. 289
45° Elbow

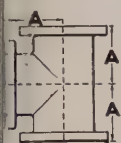


Fig. 290
Tee

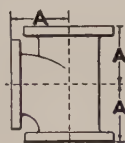


Fig. 291
Single Sweep
Tee

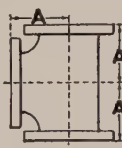


Fig. 292
Double Sweep
Tee

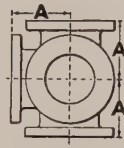


Fig. 293
Side Outlet
Tee

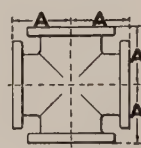


Fig. 294
Cross

Size.....inches	56	58	60	62	64	66	68	70	72	74	76	78
AA-Face to Face, Tees and Crosses.....	82	84	88	90	94	96	100	102	106	108	112	116
A-Center to Face, Ells, Tees and Crosses.....	41	42	44	45	47	48	50	51	53	54	56	58
B-Center to Face, Long Radius Ells.....	74	76 $\frac{1}{2}$	79	81 $\frac{1}{2}$	84	86 $\frac{1}{2}$	89	91 $\frac{1}{2}$	94	96 $\frac{1}{2}$	99	101 $\frac{1}{2}$
C-Center to Face, 45° Ells.....	28	29	30	31	32	33	34	35	36	37	38	39
G-Face to Face, Reducers.....	56	58	60	62	64	66	68	70	72	74	76	78
Diameter of Flanges.....	68 $\frac{3}{4}$	71	73	75 $\frac{3}{4}$	78	80	82	84 $\frac{1}{2}$	86 $\frac{1}{2}$	88 $\frac{1}{2}$	90 $\frac{3}{4}$	93
Thickness of Flanges.....	3	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{3}{8}$	3 $\frac{3}{8}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{5}{8}$	3 $\frac{5}{8}$	3 $\frac{3}{4}$

Size.....inches	80	82	84	86	88	90	92	94	96	98	100
AA-Face to Face, Tees and Crosses.....	118	120	124	126	130	134	136	138	142	146	148
A-Center to Face, Ells, Tees and Crosses.....	59	60	62	63	65	67	68	69	71	73	74
B-Center to Face, Long Radius Ells.....	104	106 $\frac{1}{2}$	109	111 $\frac{1}{2}$	114	116 $\frac{1}{2}$	119	121 $\frac{1}{2}$	124	126 $\frac{1}{2}$	129
C-Center to Face, 45° Ells.....	40	41	42	43	44	45	46	47	48	49	50
G-Face to Face, Reducers.....	80	82	84	86	88	90	92	94	96	98	100
Diameter of Flanges.....	95 $\frac{1}{4}$	97 $\frac{1}{2}$	99 $\frac{3}{4}$	102	104 $\frac{1}{4}$	106 $\frac{1}{2}$	108 $\frac{3}{4}$	111	113 $\frac{1}{4}$	115 $\frac{1}{2}$	117 $\frac{3}{4}$
Thickness of Flanges.....	3 $\frac{3}{4}$	3 $\frac{7}{8}$	3 $\frac{7}{8}$	4	4	4 $\frac{1}{8}$	4 $\frac{1}{8}$	4 $\frac{1}{4}$	4 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{3}{8}$

STANDARD AND LOW PRESSURE FLANGED FITTINGS GENERAL DIMENSIONS REDUCING TEES AND CROSSES SHORT BODY PATTERN

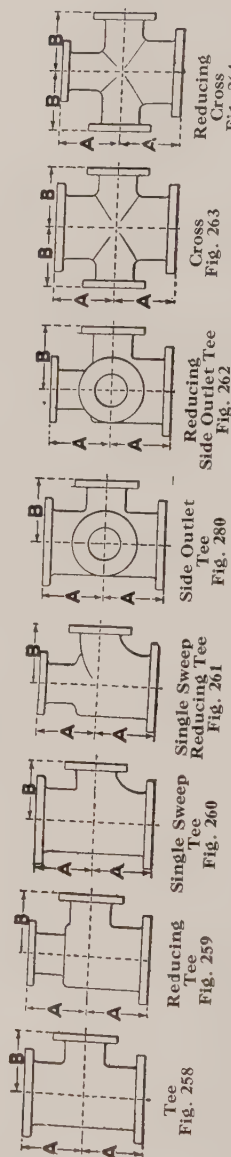


Fig. 264

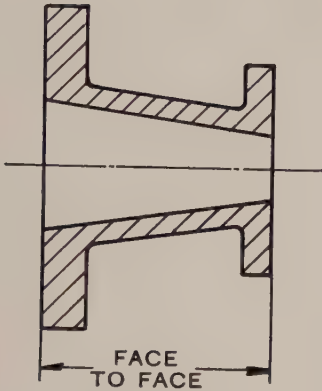
Size.	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	9	10	12	14	15	16	18	20	22	24	26	28	30	32	34	36	38	40			
*Size of Outlet and Smaller . . . in.	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	9	10	12	14	15	16	18	20	22	24	26	28	30	32	34	36	38	40			
AA—F. to F., Run . . . in.	{ All reducing fittings 1-inch to 16-inch, inclusive, have the same center to face dimensions as straight size fittings.																				12	14	15	16	18	20	22	24	26	28	30			
A—C. to F., Run . . . in.																					26	28	28	30	32	32	36	36	38	40	44			
B—C. to F., Outlet . . . in.																					13	14	14	15	16	16	18	18	19	20	20	22		
Size.	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102			
Size of Outlet and Smaller . . . in.	28	28	30	32	32	34	36	36	38	40	40	42	44	44	46	48	48	50	52	52	54	56	56	58	60	62	64	64	66	68	70			
AA—F. to F., Run . . . in.	46	46	48	52	52	54	58	58	62	66	66	68	70	70	74	80	80	84	86	86	88	94	94	96	100	100	104	106	106	110	110			
A—C. to F., Run . . . in.	23	23	24	26	26	27	29	29	31	33	33	34	35	35	37	40	40	42	43	43	44	47	47	48	50	50	52	53	55	55	58			
B—C. to F., Outlet . . . in.	30	31	33	34	35	36	37	39	40	41	42	44	45	46	47	48	49	50	52	53	54	56	57	58	61	62	63	64	65	67	70			
*LONG BODY PATTERNS are used when cast.																																		

{ All reducing fittings 1-inch to 16-inch, inclusive, have the same center to face dimensions as straight size fittings. }

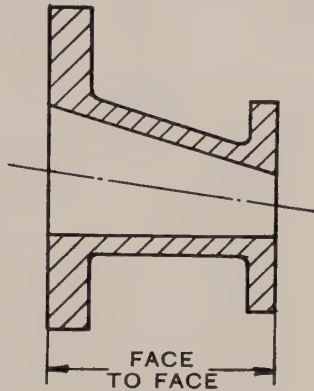
*LONG BODY PATTERNS are used when outlets are larger than given in the above table, therefore have same dimensions as straight size fittings. The dimensions of "Reducing Flanged Tee Fittings" are always regulated by the reduction of the outlet. THE RUN ONLY. The long body pattern will be used, except Double Sweep Tees, on which the reduced end is always longer than the regular fittings. Dimensions on request. BULL HEADS OR TEES having outlets larger than the run, will be the same length center to face of all openings as a Tee with all openings of the size of the outlet. For example, a 12 x 12 x 18-inch Tee will be governed by the dimensions of the 18-inch Long Body Tee, namely, 16 1/2 inches center to face of all openings and 33 inches face to face. REDUCING ELBOWS carry same center to face dimensions as regular elbows of larger straight size. For description, see page 22.

CAST IRON FLANGED REDUCERS

125 POUNDS WORKING STEAM PRESSURE



Taper Reducer
Fig. 265



Eccentric Reducer
Fig. 266

Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face
3 x 2	6	7 x 5	10	14 x 8	16	20 x 12	20
3½ x 2½	6½	7 x 6	10	14 x 10	16	20 x 14	20
4 x 2	7	8 x 3	11	14 x 12	16	20 x 16	20
4 x 2½	7	8 x 4	11	15 x 8	17	20 x 18	20
4 x 3	7	8 x 5	11	15 x 10	17	22 x 14	22
5 x 2	8	8 x 6	11	15 x 12	17	22 x 16	22
5 x 2½	8	10 x 4	12	15 x 14	17	22 x 18	22
5 x 3	8	10 x 5	12	16 x 8	18	22 x 20	22
5 x 4	8	10 x 6	12	16 x 10	18	24 x 16	24
6 x 3	9	10 x 8	12	16 x 12	18	24 x 18	24
6 x 3½	9	12 x 5	14	16 x 14	18	24 x 20	24
6 x 4	9	12 x 6	14	18 x 10	19	24 x 22	24
6 x 5	9	12 x 8	14	18 x 12	19	.....	..
7 x 3	10	12 x 10	14	18 x 14	19	.....	..
7 x 4	10	14 x 6	16	18 x 16	19	.....	..

For description, see page 22.

For price list, see page 108.

For drilling, see page 408.

STANDARD CAST IRON SCREWED FLANGES

PRESSURES UP TO AND INCLUDING 125 POUNDS
ATWOOD LAP FLANGE. CAST STEEL

(See Note Below)

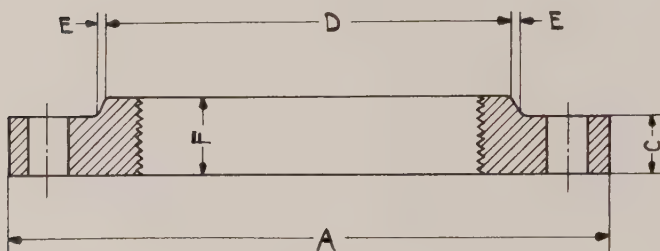


Fig. 25

Size Inches	A	C	D	E	F
$\frac{1}{2}$	....	...	....	..	...
$\frac{3}{4}$	....	...	....	$\frac{1}{16}$	...
1	4	$\frac{7}{16}$	$1\frac{15}{16}$	$\frac{1}{16}$	$\frac{11}{16}$
$1\frac{1}{4}$	$4\frac{1}{2}$	$\frac{1}{2}$	$2\frac{3}{16}$	$\frac{1}{16}$	$\frac{13}{16}$
$1\frac{1}{2}$	5	$\frac{9}{16}$	$2\frac{5}{8}$	$\frac{1}{16}$	$\frac{7}{8}$
2	6	$\frac{5}{8}$	3	$\frac{3}{32}$	1
$2\frac{1}{2}$	7	$\frac{11}{16}$	$3\frac{3}{4}$	$\frac{3}{32}$	$1\frac{1}{8}$
3	$7\frac{1}{2}$	$\frac{3}{4}$	$4\frac{1}{4}$	$\frac{1}{8}$	$1\frac{3}{16}$
$3\frac{1}{2}$	$8\frac{1}{2}$	$\frac{13}{16}$	$4\frac{13}{16}$	$\frac{5}{32}$	$1\frac{1}{4}$
4	9	$\frac{15}{16}$	$5\frac{3}{8}$	$\frac{5}{32}$	$1\frac{5}{16}$
$4\frac{1}{2}$	$9\frac{1}{4}$	$\frac{15}{16}$	$5\frac{13}{16}$	$\frac{5}{32}$	$1\frac{3}{8}$
5	10	$\frac{15}{16}$	$6\frac{3}{8}$	$\frac{5}{32}$	$1\frac{3}{8}$
6	11	1	$7\frac{1}{16}$	$\frac{5}{32}$	$1\frac{1}{2}$
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$8\frac{9}{16}$	$\frac{5}{32}$	$1\frac{5}{8}$
8	$13\frac{1}{2}$	$1\frac{1}{8}$	$9\frac{5}{8}$	$\frac{3}{16}$	$1\frac{11}{16}$
9	15	$1\frac{1}{8}$	$10\frac{11}{16}$	$\frac{3}{16}$	$1\frac{13}{16}$
10	16	$1\frac{3}{16}$	$11\frac{13}{16}$	$\frac{3}{16}$	$1\frac{15}{16}$
12	19	$1\frac{1}{4}$	$14\frac{1}{8}$	$\frac{1}{4}$	$2\frac{1}{8}$
14	21	$1\frac{3}{8}$	$15\frac{1}{2}$	$\frac{1}{4}$	$2\frac{1}{4}$
15	$22\frac{1}{4}$	$1\frac{3}{8}$	$16\frac{5}{8}$	$\frac{1}{4}$	$2\frac{3}{8}$
16	$23\frac{1}{2}$	$1\frac{7}{16}$	$17\frac{3}{4}$	$\frac{1}{4}$	$2\frac{7}{16}$
18	25	$1\frac{9}{16}$	$19\frac{3}{4}$	$\frac{1}{4}$	$2\frac{9}{8}$
20	$27\frac{1}{2}$	$1\frac{11}{16}$	$21\frac{7}{8}$	$\frac{1}{4}$	$2\frac{7}{8}$

For description, see page 43.

For drilling, see page 408.

For price list, see page 115.

These Flanges are also used for the Atwood Lap and for this service are made in Cast Steel. The cross section is as shown above, except the bore.

For price list, see page 118.

CAST IRON HIGH HUB FLANGES
PRESSURES UP TO AND INCLUDING 125 POUNDS
ATWOOD LAP FLANGE

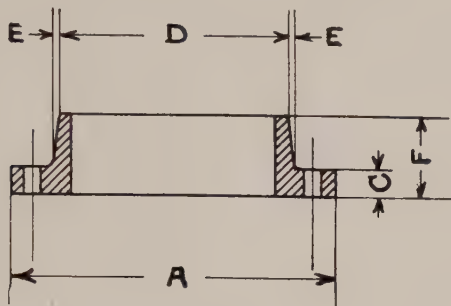


Fig. 27

Size Inches	A	C	D	E	F
4	9	$\frac{15}{16}$	$5\frac{1}{2}$	$\frac{1}{8}$	$2\frac{7}{8}$
$4\frac{1}{2}$	$9\frac{1}{4}$	$\frac{15}{16}$	$5\frac{3}{4}$	$\frac{1}{8}$	3
5	10	$\frac{15}{16}$	$6\frac{3}{4}$	$\frac{1}{8}$	$3\frac{1}{8}$
6	11	1	$7\frac{1}{2}$	$\frac{1}{8}$	$3\frac{1}{4}$
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$8\frac{3}{4}$	$\frac{1}{8}$	$3\frac{3}{8}$
8	$13\frac{1}{2}$	$1\frac{1}{8}$	$9\frac{3}{4}$	$\frac{1}{8}$	$3\frac{1}{2}$
9	15	$1\frac{1}{8}$	11	$\frac{1}{8}$	$3\frac{5}{8}$
10	16	$1\frac{3}{16}$	12	$\frac{1}{8}$	$3\frac{3}{4}$
12	19	$1\frac{1}{4}$	$14\frac{1}{2}$	$\frac{3}{16}$	4
14	21	$1\frac{3}{8}$	$15\frac{1}{8}$	$\frac{3}{16}$	$4\frac{3}{8}$
15	$22\frac{1}{4}$	$1\frac{3}{8}$	$16\frac{7}{8}$	$\frac{3}{16}$	$4\frac{1}{2}$
16	$23\frac{1}{2}$	$1\frac{7}{16}$	$17\frac{1}{8}$	$\frac{3}{16}$	$4\frac{3}{4}$
18	25	$1\frac{9}{16}$	$19\frac{1}{8}$	$\frac{3}{16}$	5
20	$27\frac{1}{2}$	$1\frac{11}{16}$	22	$\frac{3}{16}$	$5\frac{3}{8}$
22	$29\frac{1}{2}$	$1\frac{13}{16}$	24	$\frac{3}{16}$	$5\frac{3}{4}$
24	32	$1\frac{7}{8}$	$26\frac{1}{8}$	$\frac{3}{16}$	6
26	$34\frac{1}{4}$	2	$28\frac{1}{4}$	$\frac{3}{16}$	6
28	$36\frac{1}{2}$	$2\frac{1}{16}$	$30\frac{3}{8}$	$\frac{3}{16}$	6
30	$38\frac{3}{4}$	$2\frac{1}{8}$	$32\frac{1}{2}$	$\frac{3}{16}$	6

For description, see page 44.

For drilling, see page 408.

For price list, see page 118.

These Flanges are used for the Shrunk Joint and the Atwood Lap.

TEMPLATES FOR DRILLING

STANDARD PRESSURE

FLANGED VALVES AND FITTINGS

AMERICAN STANDARD FOR 125 POUNDS

Effective January 1, 1914

Size Inches	Diameter of Flanges	Thickness of Flanges	Bolt Circle	Number of Bolts	Size of Bolts	Length of Bolts	Length of Studs with 2 Nuts
1	4	$\frac{7}{16}$	3	4	$\frac{7}{16}$	$1\frac{1}{2}$	
$1\frac{1}{4}$	$4\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{8}$	4	$\frac{7}{16}$	$1\frac{3}{4}$	
$1\frac{1}{2}$	5	$\frac{9}{16}$	$3\frac{7}{8}$	4	$\frac{1}{2}$	2	
2	6	$\frac{5}{8}$	$4\frac{3}{4}$	4	$\frac{5}{8}$	$2\frac{1}{4}$	
$2\frac{1}{2}$	7	$\frac{11}{16}$	$5\frac{1}{2}$	4	$\frac{5}{8}$	$2\frac{1}{4}$	
3	$7\frac{1}{2}$	$\frac{3}{4}$	6	4	$\frac{5}{8}$	$2\frac{1}{2}$	
$3\frac{1}{2}$	$8\frac{1}{2}$	$\frac{13}{16}$	7	4	$\frac{5}{8}$	$2\frac{1}{2}$	
4	9	$\frac{15}{16}$	$7\frac{1}{2}$	8	$\frac{5}{8}$	$2\frac{3}{4}$	
$4\frac{1}{2}$	$9\frac{1}{4}$	$\frac{15}{16}$	$7\frac{3}{4}$	8	$\frac{3}{4}$	3	
5	10	$\frac{15}{16}$	$8\frac{1}{2}$	8	$\frac{3}{4}$	3	
6	11	1	$9\frac{1}{2}$	8	$\frac{3}{4}$	3	
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$10\frac{3}{4}$	8	$\frac{3}{4}$	$3\frac{1}{4}$	
8	$13\frac{1}{2}$	$1\frac{1}{8}$	$11\frac{3}{4}$	8	$\frac{3}{4}$	$3\frac{1}{4}$	
9	15	$1\frac{1}{8}$	$13\frac{1}{4}$	12	$\frac{3}{4}$	$3\frac{1}{4}$	
10	16	$1\frac{3}{16}$	$14\frac{1}{4}$	12	$\frac{7}{8}$	$3\frac{1}{2}$	
12	19	$1\frac{1}{4}$	17	12	$\frac{7}{8}$	$3\frac{3}{4}$	
14	21	$1\frac{3}{8}$	$18\frac{3}{4}$	12	1	4	
15	$22\frac{1}{4}$	$1\frac{3}{8}$	20	16	1	4	
16	$23\frac{1}{2}$	$1\frac{7}{16}$	$21\frac{1}{4}$	16	1	$4\frac{1}{4}$	
18	25	$1\frac{9}{16}$	$22\frac{3}{4}$	16	$1\frac{1}{8}$	$4\frac{1}{2}$	
20	$27\frac{1}{2}$	$1\frac{11}{16}$	25	20	$1\frac{1}{8}$	$4\frac{3}{4}$	
22	$29\frac{1}{2}$	$1\frac{13}{16}$	$27\frac{1}{4}$	20	$1\frac{1}{4}$	$5\frac{1}{4}$	
24	32	$1\frac{7}{8}$	$29\frac{1}{2}$	20	$1\frac{1}{4}$	$5\frac{1}{4}$	
26	$34\frac{1}{4}$	2	$31\frac{3}{4}$	24	$1\frac{1}{4}$	$5\frac{1}{2}$	
28	$36\frac{1}{2}$	$2\frac{1}{16}$	34	28	$1\frac{1}{4}$	$5\frac{3}{4}$	
30	$38\frac{3}{4}$	$2\frac{1}{8}$	36	28	$1\frac{3}{8}$	6	
32	$41\frac{3}{4}$	$2\frac{1}{4}$	$38\frac{1}{2}$	28	$1\frac{1}{2}$	$6\frac{1}{4}$	
34	$43\frac{3}{4}$	$2\frac{5}{16}$	$40\frac{1}{2}$	32	$1\frac{1}{2}$	$6\frac{1}{2}$	
36	46	$2\frac{3}{8}$	$42\frac{3}{4}$	32	$1\frac{1}{2}$	$6\frac{1}{2}$	
38	$48\frac{3}{4}$	$2\frac{3}{8}$	$45\frac{1}{4}$	32	$1\frac{5}{8}$	$6\frac{3}{4}$	$8\frac{1}{2}$
40	$50\frac{3}{4}$	$2\frac{1}{2}$	$47\frac{1}{4}$	36	$1\frac{5}{8}$	7	$8\frac{3}{4}$

Concluded on page 409. Numbers of holes are in multiples of four, so that fittings may be made to face to any quarter. Bolt holes straddle center lines.

Bolt holes are drilled $\frac{1}{8}$ inch larger than nominal diameter of bolts, except for bolts $1\frac{3}{4}$ inch diameter and larger when holes are drilled $\frac{1}{4}$ inch larger than diameter of bolt.

TEMPLATES FOR DRILLING—Concluded

STANDARD PRESSURE FLANGED VALVES AND FITTINGS AMERICAN STANDARD FOR 125 POUNDS

Effective January 1, 1914

Size Inches	Diameter of Flanges	Thickness of Flanges	Bolt Circle	Number of Bolts	Size of Bolts	Length of Bolts	Length of Studs with 2 Nuts
42	53	2 ⁵ / ₈	49 ¹ / ₂	36	1 ⁵ / ₈	7 ¹ / ₄	9
44	55 ¹ / ₄	2 ⁵ / ₈	51 ³ / ₄	40	1 ⁵ / ₈	7 ¹ / ₄	9
46	57 ¹ / ₄	2 ¹¹ / ₁₆	53 ³ / ₄	40	1 ⁵ / ₈	7 ¹ / ₂	9 ¹ / ₄
48	59 ¹ / ₂	2 ³ / ₄	56	44	1 ⁵ / ₈	7 ¹ / ₂	9 ¹ / ₂
50	61 ³ / ₄	2 ³ / ₄	58 ¹ / ₄	44	1 ³ / ₄	7 ³ / ₄	9 ¹ / ₂
52	64	2 ⁷ / ₈	60 ¹ / ₂	44	1 ³ / ₄	8	9 ³ / ₄
54	66 ¹ / ₄	3	62 ³ / ₄	44	1 ³ / ₄	8 ¹ / ₄	10
56	68 ³ / ₄	3	65	48	1 ³ / ₄	8 ¹ / ₂	10
58	71	3 ¹ / ₈	67 ¹ / ₄	48	1 ³ / ₄	8 ¹ / ₂	10 ¹ / ₂
60	73	3 ¹ / ₈	69 ¹ / ₄	52	1 ³ / ₄	8 ¹ / ₂	10 ¹ / ₂
62	75 ³ / ₄	3 ¹ / ₄	71 ³ / ₄	52	1 ⁷ / ₈	8 ³ / ₄	10 ³ / ₄
64	78	3 ¹ / ₄	74	52	1 ⁷ / ₈	8 ³ / ₄	10 ³ / ₄
66	80	3 ³ / ₈	76	52	1 ⁷ / ₈	9 ¹ / ₄	11 ¹ / ₄
68	82 ¹ / ₄	3 ³ / ₈	78 ¹ / ₄	56	1 ⁷ / ₈	9 ¹ / ₄	11 ¹ / ₄
70	84 ¹ / ₂	3 ¹ / ₂	80 ¹ / ₂	56	1 ⁷ / ₈	9 ¹ / ₂	11 ¹ / ₂
72	86 ¹ / ₂	3 ¹ / ₂	82 ¹ / ₂	60	1 ⁷ / ₈	9 ¹ / ₂	11 ¹ / ₂
74	88 ¹ / ₂	3 ⁵ / ₈	84 ¹ / ₂	60	1 ⁷ / ₈	9 ³ / ₄	11 ³ / ₄
76	90 ³ / ₄	3 ⁵ / ₈	86 ¹ / ₂	60	1 ⁷ / ₈	9 ³ / ₄	11 ³ / ₄
78	93	3 ³ / ₄	88 ³ / ₄	60	2	10	12 ¹ / ₄
80	95 ¹ / ₄	3 ³ / ₄	91	60	2	10	12 ¹ / ₄
82	97 ¹ / ₂	3 ⁷ / ₈	93 ¹ / ₄	60	2	10	12 ¹ / ₂
84	99 ³ / ₄	3 ⁷ / ₈	95 ¹ / ₂	64	2	10 ¹ / ₄	12 ¹ / ₂
86	102	4	97 ³ / ₄	64	2	10 ¹ / ₂	12 ³ / ₄
88	104 ¹ / ₄	4	100	68	2	10 ¹ / ₂	12 ³ / ₄
90	106 ¹ / ₂	4 ¹ / ₈	102 ¹ / ₄	68	2 ¹ / ₈	11	13 ¹ / ₄
92	108 ³ / ₄	4 ¹ / ₈	104 ¹ / ₂	68	2 ¹ / ₈	11	13 ¹ / ₄
94	111	4 ¹ / ₄	106 ¹ / ₄	68	2 ¹ / ₈	11 ¹ / ₄	13 ¹ / ₂
96	113 ¹ / ₄	4 ¹ / ₄	108 ¹ / ₂	68	2 ¹ / ₄	11 ¹ / ₄	13 ³ / ₄
98	115 ¹ / ₂	4 ³ / ₈	110 ³ / ₄	68	2 ¹ / ₄	11 ¹ / ₂	14
100	117 ³ / ₄	4 ³ / ₈	113	68	2 ¹ / ₄	11 ¹ / ₂	14

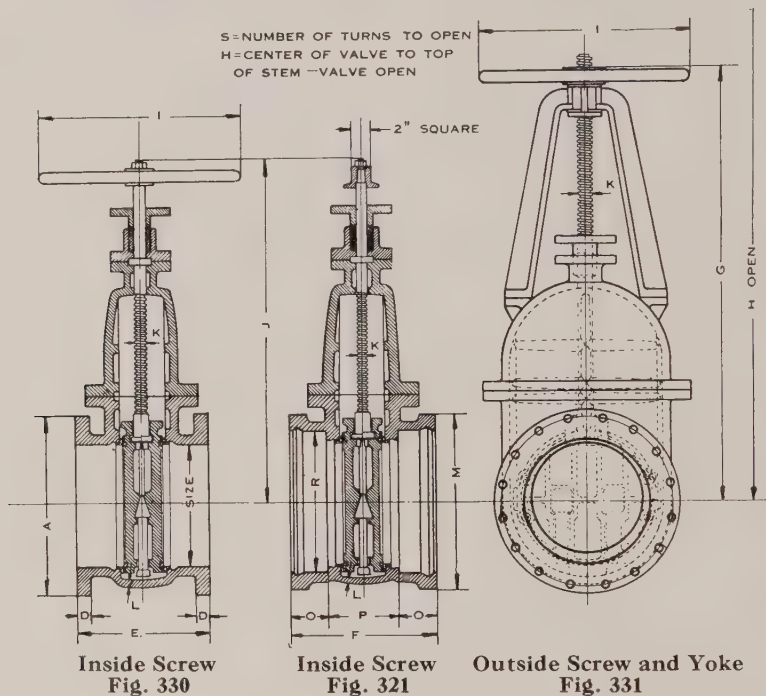
Number of holes are in multiples of four, so that fittings may be made to face to any quarter. Bolt holes straddle center lines.

Bolt holes are drilled ¹/₈ inch larger than nominal diameter of bolts, except for bolts ¹/₄ inch diameter and larger, when holes are drilled ¹/₄ inch larger than diameter of bolt.

MEDIUM PRESSURE GATE VALVES

No. 3 P

IRON BODY. BRONZE MOUNTED. PARALLEL SEAT.
200 POUNDS WORKING WATER PRESSURE



Size...in.	1½	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	5	6	7	7½	9	10	11	12½	13½	16	19	21	22¼	23½
D	9⅞	5⅞	11⅞	3¼	15⅞	10½	1	1½	1⅞	1⅞	1¼	1⅞	1⅞	1⅞
E	6½	7½	7½	8½	10	10½	11¼	12	13	14	16¼	16½	16¾	17
F	6	6	7	7½	9	9	12	12	15	18	18	21	21	21
G	12¼	13½	15¼	17¾	20⅞	25	28¼	31¼	33	39⅞	45¼	52½	55⅞	56½
H	14⅞	16⅞	18⅞	21½	25⅞	31½	36	39¾	42¾	50¾	59¼	68⅞	70¾	74¼
I	6	6	7½	9	9	12	12	15	15	18	18	21	21	21
J	11⅞	12¾	14¾	16¾	18¾	23¼	25	26½	28¼	33¼	36½	41⅞	43⅞	44⅞
K	3¼	3¼	7⅞	1	1	1⅞	1⅞	1¼	1¼	1½	1½	1⅞	1⅞	1⅞
L	3⅞	3⅞	7⅞	1	1	1⅞	1⅞	1¼	1¼	1½	1½	1⅞	1⅞	1⅞
M	...	...	...	...	8⅞	9⅞	11⅞	12⅞	13¼	15¾	18	20⅞	21⅞	22⅞
O	...	...	...	...	3	3½	3½	3½	4	4	4½	4½	4½	4½
P	...	...	...	...	6½	6⅞	7⅞	7½	7⅞	7⅞	8⅞	8⅞	8⅞	8⅞
R	...	...	...	...	5¾	6⅞	8	9	10	12½	14¼	16¾	17¾	18½
S	11	14	17	13	17	21	26	15	17	21	25	29	31	33

For drilling, see page 408.

For description, see page 123.

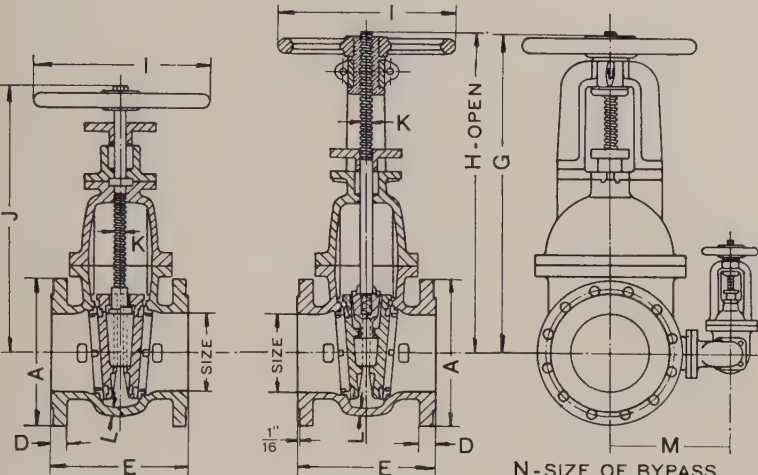
For price list, see page 125.

MEDIUM PRESSURE FLANGED GATE VALVES No. 3 T

WITH AND WITHOUT BY-PASS

IRON BODY. BRONZE MOUNTED. TAPER SEAT.

175 POUNDS WORKING STEAM PRESSURE



Inside Screw
Fig. 317

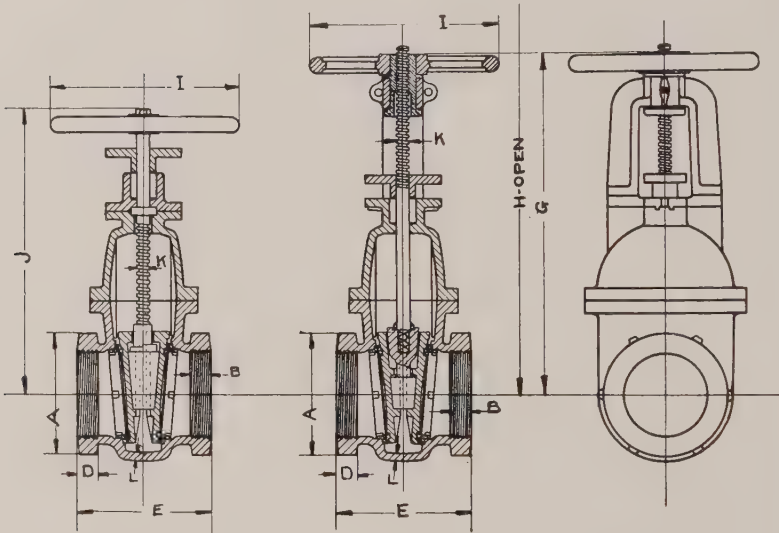
Outside Screw
Fig. 318

Size....in.	3	4	5	6	7	8	10	12	14	15	16
A	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
D	1⅞	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅞	2⅝	2¼
E	9½	10½	11½	12	12½	13½	15	16	18	18¾	19½
G	16⅞	18⅝	22½	25	28¼	32¾	37⅝	42⅝	49	51⅝	54⅞
H	20	23½	28	31½	36¼	41⅞	48¾	55¾	64¼	67⅞	71⅜
I	9	9	12	12	15	18	18	18	21	21	21
J	15⅜	16⅞	21⅞	22⅝	25¼	27⅜	30⅜	33⅜	38¾	40½	42
K	1	1	1⅞	1⅞	1¼	1½	1½	1½	1¾	1¾	1¾
L	⅜	⅞	⅞	⅞	⅞	⅞	¾	¾	⅞	⅞	1
M	....	....	....	9½	10	13⅞	14¾	16¼	17¾	18½	22¼
N	....	....	....	1¼	1¼	1½	1½	2	2	2	3
O	14	18	22	26	15	17	21	25	30	32	34

For drilling, see page 461.
For description, see page 126.
For price list, see page 127.

MEDIUM PRESSURE SCREWED GATE VALVES No. 3 T

IRON BODY. BRONZE MOUNTED. TAPER SEAT.
175 POUNDS WORKING STEAM PRESSURE



Inside Screw
Fig. 319

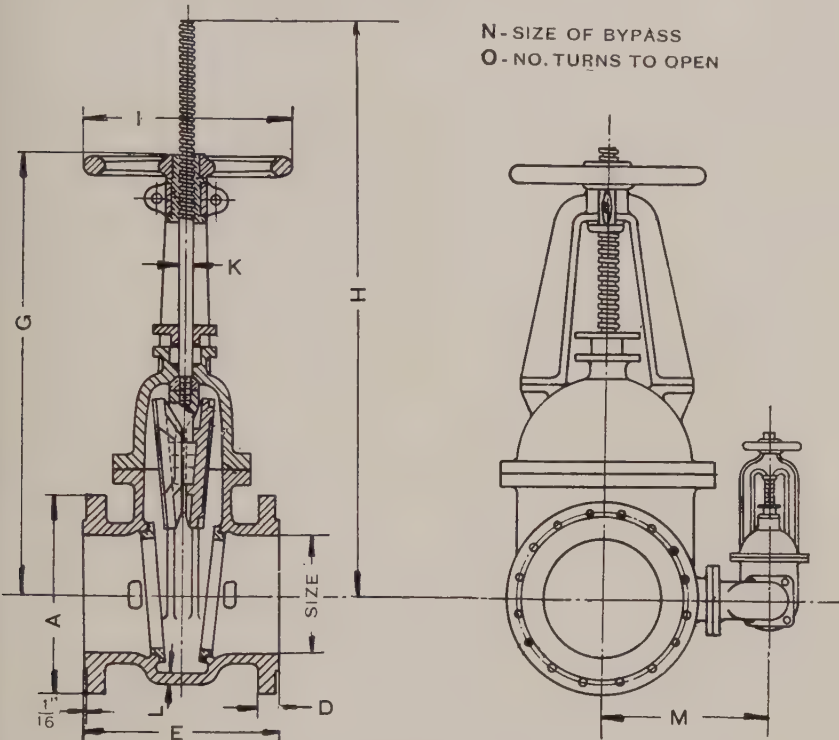
Outside Screw
Fig. 320

"O" = Number of turns to open

Size . . . in.	3	4	5	6	7	8	10	12
A	5 ⁵ / ₁₆	6 ³ / ₄	7 ⁷ / ₈	9 ¹ / ₄	10 ¹ / ₄	11 ¹ / ₂	13 ⁵ / ₈	16 ³ / ₈
B	1 ⁵ / ₁₆	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ⁵ / ₈	1 ³ / ₄	1 ⁷ / ₈	2 ¹ / ₁₆	2 ¹ / ₄
D	1 ⁵ / ₁₆	1 ⁷ / ₁₆	1 ⁹ / ₁₆	1 ⁵ / ₈	1 ³ / ₄	1 ⁷ / ₈	2 ¹ / ₁₆	2 ¹ / ₄
E	7 ³ / ₄	8 ¹ / ₈	9	9 ¹ / ₄	10	11	11 ¹ / ₄	12
G	16 ¹ / ₈	18 ⁵ / ₈	22	25	28 ¹ / ₄	32 ³ / ₄	37 ⁵ / ₈	42 ⁵ / ₈
H	20	23 ¹ / ₂	28	31 ¹ / ₂	36 ¹ / ₄	41 ⁷ / ₈	48 ³ / ₄	55 ³ / ₄
I	9	9	12	12	15	18	18	18
J	15 ³ / ₈	16 ⁷ / ₈	21 ¹ / ₈	22 ⁵ / ₈	25 ¹ / ₄	27 ³ / ₈	30 ³ / ₈	33 ³ / ₈
K	1	1	1 ¹ / ₈	1 ¹ / ₈	1 ¹ / ₄	1 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂
L	3 ³ / ₈	7 ⁷ / ₁₆	9 ⁹ / ₁₆	5 ⁵ / ₈	5 ⁵ / ₈	11 ¹¹ / ₁₆	3 ³ / ₄	13 ¹³ / ₁₆
O	14	18	22	26	15	17	21	25

For description, see page 126.
For price list, see page 127.

EXTRA HEAVY GATE VALVES No. 4 T
WITH OR WITHOUT BY-PASS
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT.
250 POUNDS WORKING STEAM PRESSURE



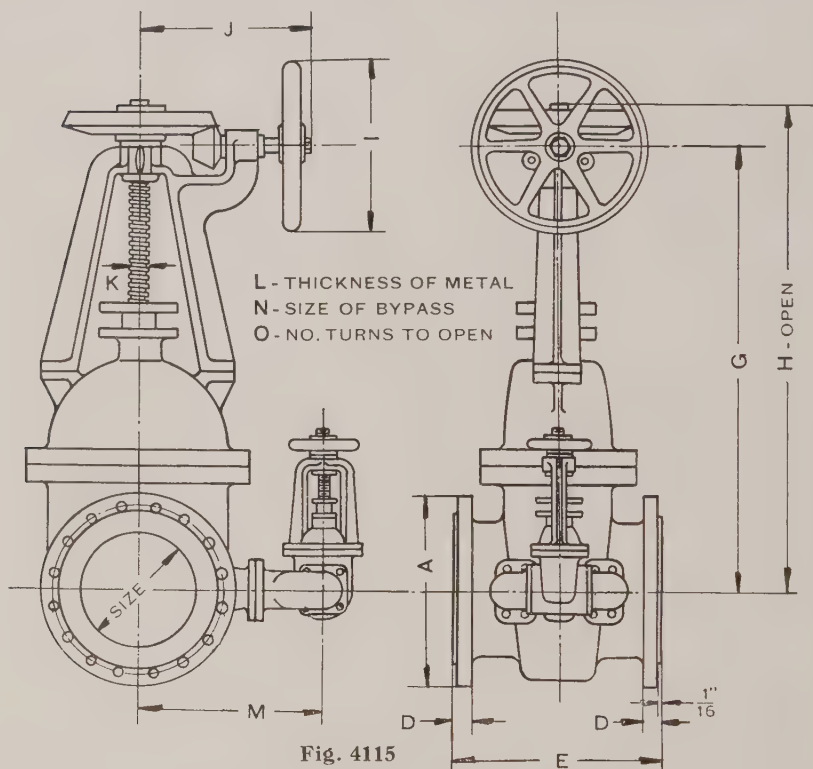
Outside Screw and Yoke Valve

Fig. 4114

Size in.	1½	2	2½	3	4	5	6	7	8	10	12	14	15	16	18	20	22	24	28
A	6	6½	7½	8½	10	11	12½	14	15	17½	20½	23	24½	25½	28	30½	33	36	40¾
D	7	8½	9	11	11½	13	15	16½	18	19¾	21½	21½	21½	21½	24	26	29	31	2¾
E	12	15½	16½	18½	23	27½	30	33½	37	42	49	54	57½	61½	69	74	82¾	90	97¾
G	14½	18¾	20½	22½	28½	34½	38	42	47	54	63½	70	74¾	79¾	89½	96½	107½	117	128
H	6	7½	9	9	12	15	15	15	18	18	21	21	27	27	32	32	36	Gear	Gear
I	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2½	3½
K	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2½	3½
L	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2½	3½
M	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2½	3½
N	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2½	3½
O	13	14	12	14	17	12	13	16	18	22	26	29	32	34	38	42	47	179	325

For drilling, see page 461.
For description, see page 129.
For price list, see page 133.

EXTRA HEAVY GATE VALVES No. 4 T
BEVEL GEARED
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT.
250 POUNDS WORKING STEAM PRESSURE



Size. in.	8	10	12	14	15	16	18	20	22	24	28
A	15	17 $\frac{1}{2}$	20 $\frac{1}{2}$	23	24 $\frac{1}{2}$	25 $\frac{1}{2}$	28	30 $\frac{1}{2}$	33	36	40 $\frac{3}{4}$
D	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{3}{16}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	2 $\frac{15}{16}$
E	16 $\frac{1}{2}$	18	19 $\frac{3}{4}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	24	26	29	31	33
G	35 $\frac{7}{16}$	40 $\frac{7}{16}$	45 $\frac{11}{16}$	50 $\frac{15}{16}$	54 $\frac{3}{16}$	57 $\frac{11}{16}$	65 $\frac{11}{16}$	70 $\frac{11}{16}$	79 $\frac{5}{16}$	86 $\frac{11}{16}$	91 $\frac{1}{4}$
H	47	54	63 $\frac{1}{4}$	70	74 $\frac{3}{4}$	79 $\frac{5}{8}$	89 $\frac{1}{2}$	96 $\frac{1}{2}$	107 $\frac{1}{2}$	117	128
I	15	15	18	18	21	21	27	27	27	27	27
J	14 $\frac{3}{4}$	14 $\frac{3}{4}$	16 $\frac{3}{4}$	16 $\frac{3}{4}$	17	17	21 $\frac{1}{4}$	21 $\frac{1}{4}$	21 $\frac{1}{4}$	21 $\frac{1}{4}$	21 $\frac{1}{4}$
K	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2	2	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3 $\frac{1}{2}$
L	1	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{5}{16}$	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	2 $\frac{1}{2}$
M	14 $\frac{5}{8}$	15 $\frac{5}{8}$	17 $\frac{3}{4}$	18 $\frac{3}{4}$	20 $\frac{3}{8}$	22 $\frac{5}{8}$	23 $\frac{3}{4}$	24 $\frac{7}{8}$	26 $\frac{1}{2}$	27 $\frac{1}{4}$	31
N	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	2	3	3	3	4	4	5
O	36	44	61	68	75	79	114	126	141	153	325

For drilling, see page 461. For description, see page 129. For price list, see page 133.

EXTRA HEAVY GATE VALVES No. 4 T
SPUR GEARED
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT.
250 POUNDS WORKING STEAM PRESSURE

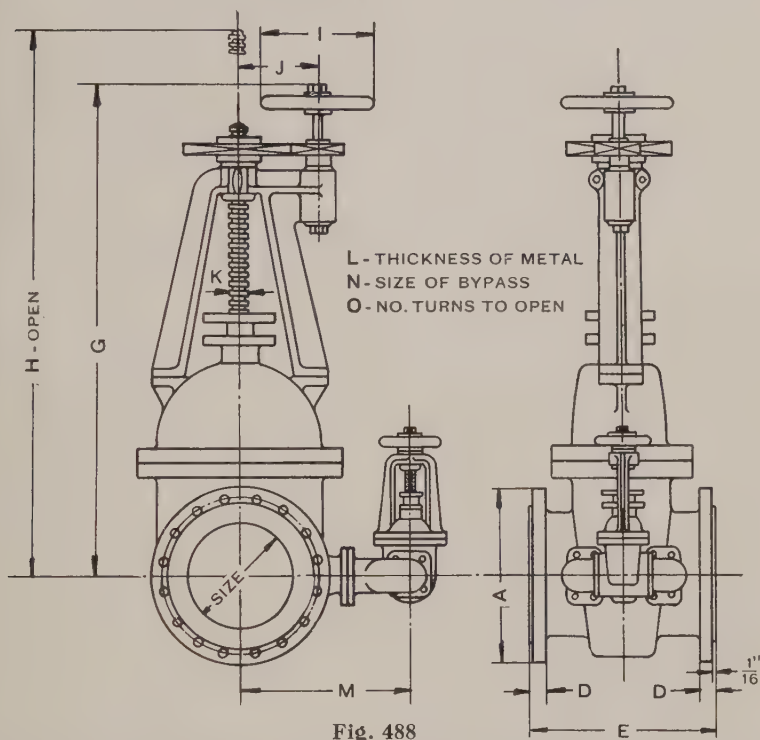


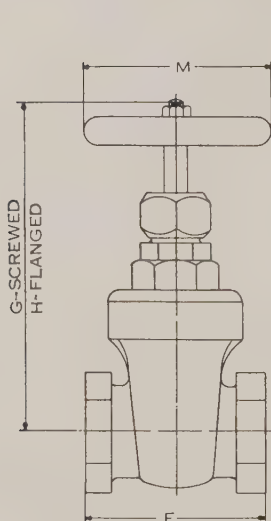
Fig. 488

Size, in.	8	10	12	14	15	16	18	20	22	24	28
A	15	17½	20½	23	24½	25½	28	30½	33	36	40¾
D	1⅝	1⅞	2	2⅛	2⅜	2¼	2⅝	2½	2⅝	2¾	2⅝
E	16½	18	19¾	21½	21½	21½	24	26	29	31	33
G	42⅞	47⅞	54⅞	59⅞	63⅞	66⅞	74¾	79¾	88	95⅞	103¼
H	47	54	63¼	70	74¾	79⅝	89½	96½	107½	117	128
I	15	15	18	18	18	18	21	21	21	21	27
J	9	9	11	11	11	11	13½	13½	13½	13½	16½
K	1½	1½	1¾	1¾	2	2	2¼	2¼	2½	2½	3½
L	1	1⅞	1⅞	1¼	1⅞	1⅞	1⅞	1½	1⅞	1¾	2½
M	14⅞	15⅞	17¾	18¾	20⅞	22⅞	23¾	24⅞	26½	27¼	31
N	1½	1½	2	2	2	3	3	3	4	4	5
O	36	44	69	77	85	91	133	147	165	179	325

For drilling, see page 461. For description, see page 129. For price list, see page 133.

EXTRA HEAVY BRONZE GATE VALVES

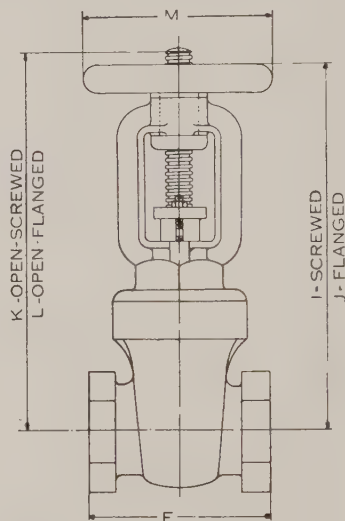
250 POUNDS WORKING STEAM PRESSURE



INSIDE SCREW

E = FACE TO FACE OF FLANGED VALVE
D = THICKNESS OF FLANGES

Fig. 417



OUTSIDE SCREW

Fig. 4235

FLANGED OR SCREWED

Size Inches	Dia. of Flange	D	E	F	G	H	I	J	K	L	M
1/2	...	..	...	2 3/4	5 5/8	....	....	....	....	....	3 1/4
3/4	...	..	...	3 1/4	6 9/16	....	....	....	....	....	3 3/4
1	4 1/2	1 1/2	4 5/8	3 3/4	7 5/8	7 3/4	7 13/16	7 15/16	9 1/4	9 3/8	4 1/4
1 1/4	5	1 3/2	4 7/8	4 1/8	8 1/8	8 1/4	8 5/16	8 7/16	9 7/8	10	4 3/4
1 1/2	6	9/16	5 1/2	4 3/4	9 1/8	9 5/16	9 3/4	10	11 7/8	12 1/16	5
2	6 1/2	5/8	6 1/4	5 1/2	11	11 1/4	11 9/16	11 13/16	14 3/16	14 7/16	6
2 1/2	7 1/2	11/16	7 1/4	6 3/4	13	13 1/4	14 7/16	14 11/16	17 9/16	17 13/16	7 1/2
3	8 3/4	3/4	8	7 1/2	13 3/8	14 1/8	15 3/4	16	19 1/8	19 3/8	7 1/2

For drilling, see page 461.

For price list, see page 134.

FLANGED GLOBE, ANGLE AND CROSS VALVES

SEMI-STEEL. BRONZE MOUNTED.
250 POUNDS WORKING STEAM PRESSURE

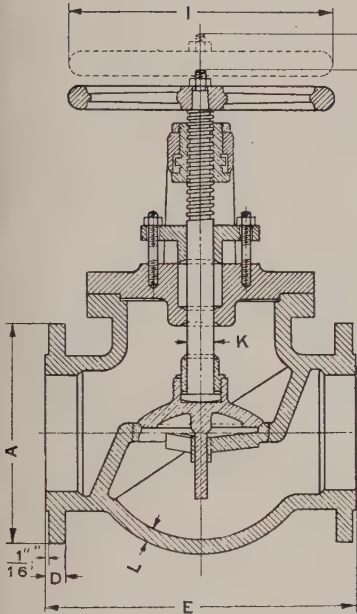


Fig. 4204
Globe Valve

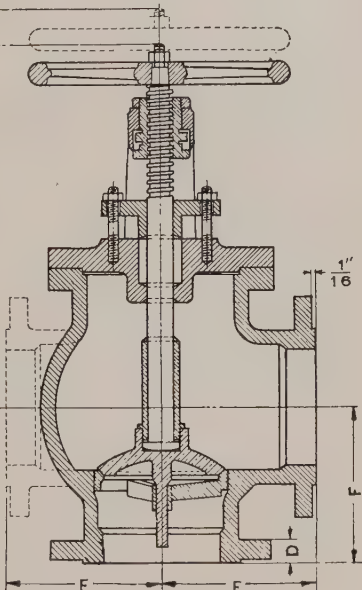


Fig. 4205
Angle Valve
Cross Valve

"O" = Number of turns to open

Size.....inches	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
D	7⁄8	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½
F	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½	15	16	17¼
G	11½	13⅜	15	17¼	20	21	23⅞	25	30	32⅞	36½	38	39
H	12⅞	14⅜	16⅞	18⅞	21½	22⅞	25⅞	27¼	32¾	35⅞	40¼	42	43¼
I	6	6	7½	9	12	15	15	18	21	27	32	36	36
K	¾	7⁄8	1	1⅛	1¼	1½	1½	1¾	2	2¼	2½	2¾	2¾
L	½	½	9⁄16	5⁄8	¾	13⁄16	1	1	1	1⅛	1⅛	1⅞	1⅞
O	4⅞	5¼	4	5½	6	6¾	8	9	11	13	15	16	17

Due to the large unbalanced pressure, we recommend the use of a by-pass on these valves for sizes larger than 6 inch.
For drilling, see page 461.
For price list, see page 135.

EXTRA HEAVY BRASS SCREWED
GLOBE, ANGLE AND CHECK VALVES

250 POUNDS WORKING STEAM PRESSURE

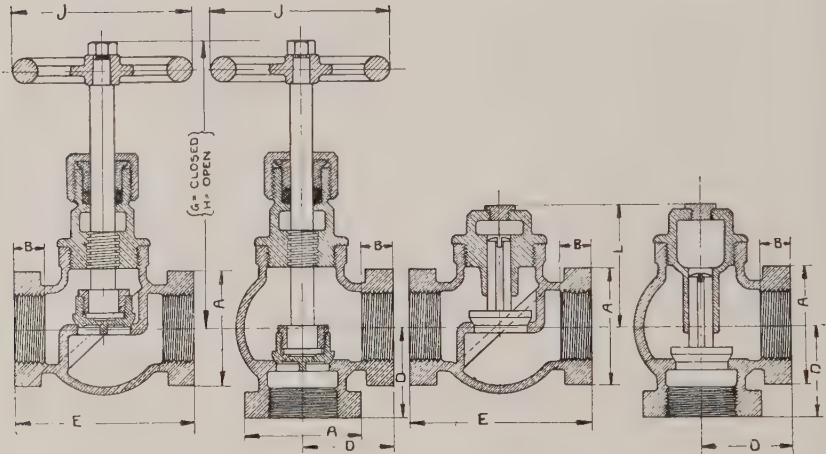


Fig. 4014
Globe Valve

Fig. 4015
Angle Valve

Fig. 4016
Horizontal
Lift Check

Fig. 4017
Angle Lift
Check

Size...in.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
A	$1\frac{1}{2}$	$1\frac{7}{8}$	$2\frac{5}{16}$	$2\frac{7}{8}$	$3\frac{3}{16}$	$3\frac{7}{8}$	$4\frac{3}{4}$	$5\frac{3}{4}$
B	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{5}{16}$
D	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{13}{16}$	$2\frac{1}{8}$	$2\frac{1}{2}$	$2\frac{7}{8}$	$3\frac{5}{8}$	4
E	$2\frac{1}{2}$	3	$3\frac{5}{8}$	$4\frac{1}{4}$	5	$5\frac{3}{4}$	$7\frac{1}{4}$	8
G	$4\frac{5}{16}$	$4\frac{13}{16}$	$5\frac{15}{16}$	$6\frac{9}{16}$	8	$8\frac{7}{16}$	$10\frac{1}{4}$	11
H	$4\frac{5}{8}$	$5\frac{3}{16}$	$6\frac{5}{16}$	7	$8\frac{1}{2}$	$9\frac{1}{16}$	11	12
J	$2\frac{7}{8}$	$3\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{1}{4}$	5	5	6	6
L	$1\frac{7}{8}$	$2\frac{3}{16}$	$2\frac{11}{16}$	$2\frac{15}{16}$	$3\frac{7}{16}$	$3\frac{13}{16}$	$4\frac{7}{16}$	$4\frac{7}{8}$

For price list, see pages 136 and 138.

EXTRA HEAVY SWING CHECK VALVES
SEMI-STEEL. BRONZE MOUNTED
250 POUNDS WORKING PRESSURE

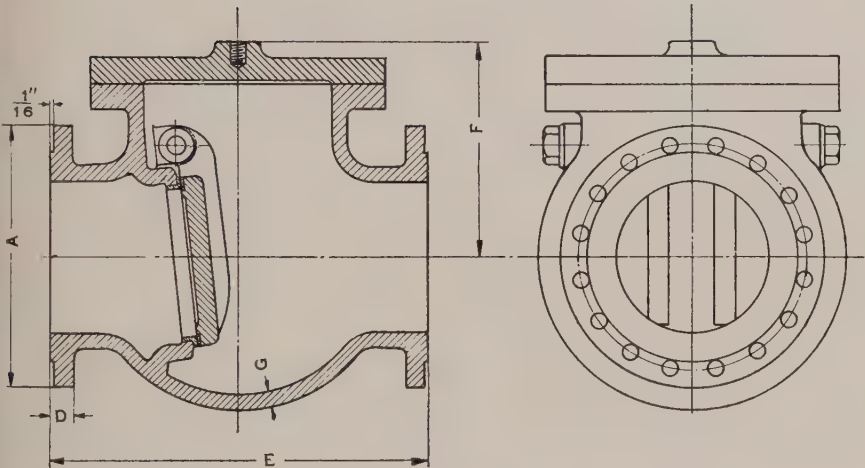


Fig. 4206

Size . in.	2	2½	3	4	5	6	7	8	10	12	14	15	16	18	20	24
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½	28	30½	36
D	7⁄8	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼	2⅝	2½	2¾
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½	37	43	45
F	5⅞	7	7⅞	8⅞	9⅞	10⅞	11⅞	12⅞	13⅞	16⅞	18	18½	18⅝	20¼	23	24½
G	½	½	9⁄16	5⁄8	¾	13⁄16	7⁄8	1	1	1⅛	1⅛	1⅜	1¼	1⅝	1½	1⅝

For drilling, see page 461.
For price list, see page 137.

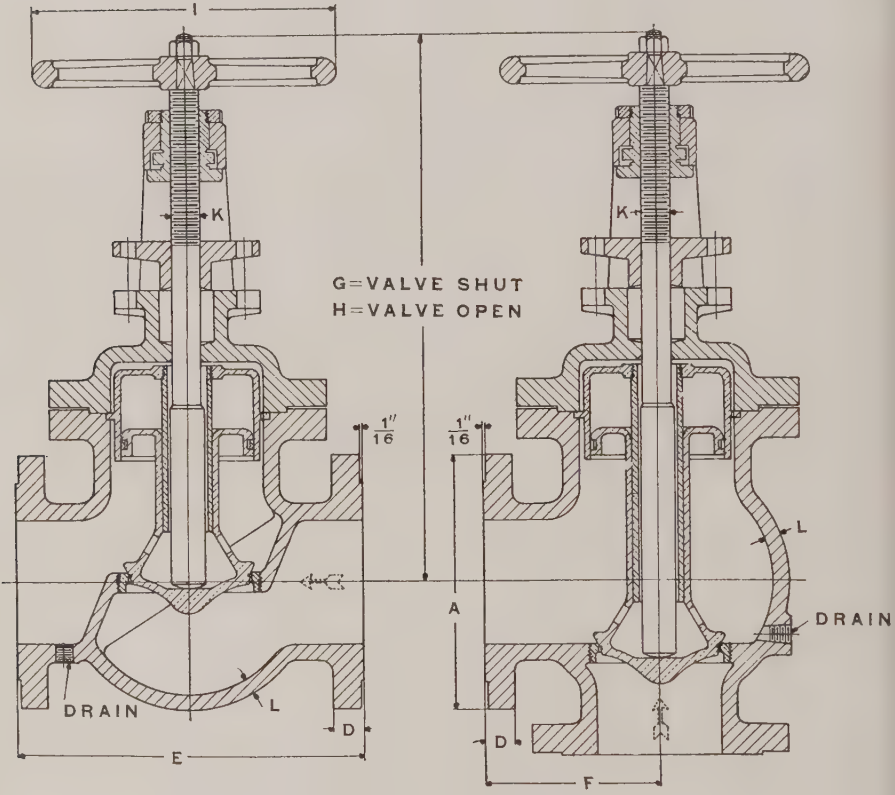
ATWOOD NON-RETURN VALVES

(STOP AND CHECK VALVES)

EXTRA HEAVY. SEMI-STEEL. BONZE MOUNTED

GLOBE AND ANGLE TYPES

250 POUNDS WORKING STEAM PRESSURE



"O" = Number of turns to open valve

Globe Type
Fig. 4207

Angle Type
Fig. 4208

Size, inches	4	5	6	7	8	10
A	10	11	12 1/2	14	15	17 1/2
D	1 1/4	1 3/8	1 7/16	1 1/2	1 5/8	1 7/8
E	13	14 1/2	17	20	21	25
F	6 1/2	7 1/4	8 1/2	10	10 1/2	12 1/2
G	20 1/2	23 1/4	26 11/16	27 7/8	30 1/4	34 1/2
H	22 1/4	25 1/4	28 15/16	30 3/8	33	37 3/4
I	9	12	15	15	18	21
K	1 1/8	1 1/4	1 1/2	1 1/2	1 3/4	2
L	5/8	3/4	13/16	7/8	1	1
O	7	8	9	10	11	13
Drain	3/4	3/4	3/4	1	1	1

For drilling, see page 461. For description, see page 139. For price list, see page 142.

ATWOOD NON-RETURN VALVES

(STOP AND CHECK VALVES)

EXTRA HEAVY. SEMI-STEEL. BRONZE MOUNTED.

VERTICAL TYPE

250 POUNDS WORKING STEAM PRESSURE

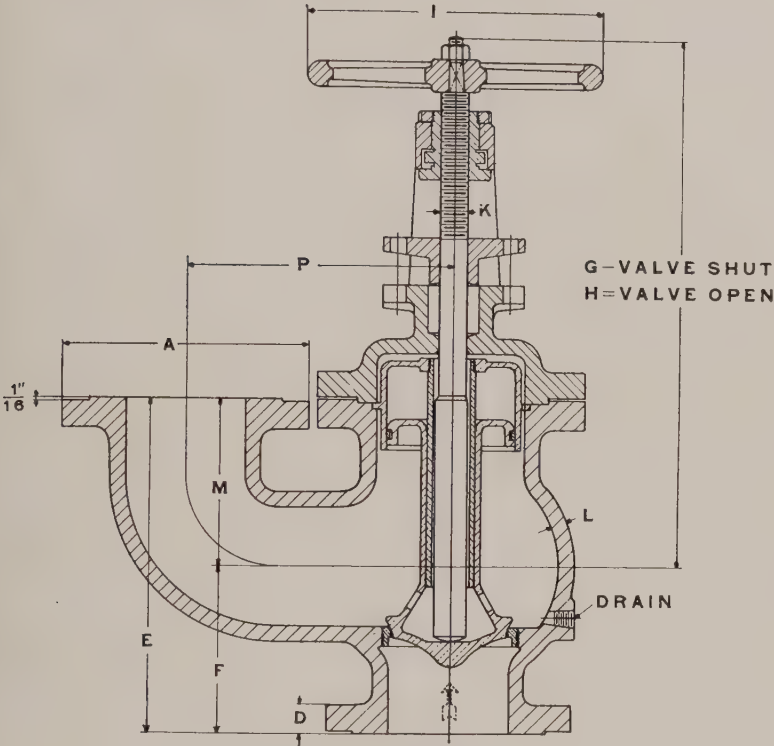


Fig. 4209

"O" = Number of turns to open valve

Size.....inches	4	5	6	7	8	10
A	10	11	12 1/2	14	15	17 1/2
D	1 1/4	1 3/8	1 7/16	1 1/2	1 5/8	1 7/8
E	13 1/4	14 3/4	17	19	20 1/2	24 1/4
F	6 1/2	7 1/4	8 1/2	10	10 1/2	12 1/2
M	6 3/4	7 1/2	8 1/2	9	10	11 3/4
G	20 1/2	23 1/4	26 11/16	27 7/8	30 1/4	34 1/2
H	22 1/4	25 1/4	28 15/16	30 3/8	33	37 3/4
I	9	12	15	15	18	21
K	1 1/8	1 1/4	1 1/2	1 1/2	1 3/4	2
L	5/8	3/4	13/16	7/8	1	1
O	7	8	9	10	11	13
P	10 1/4	12	13 1/2	15	16 1/4	19
Drain	3/4	3/4	3/4	1	1	1

For drilling, see page 461. For description, see page 139. For price list, see page 143

BLOW-OFF VALVES
EXTRA HEAVY. SEMI-STEEL.
250 POUNDS WORKING STEAM PRESSURE

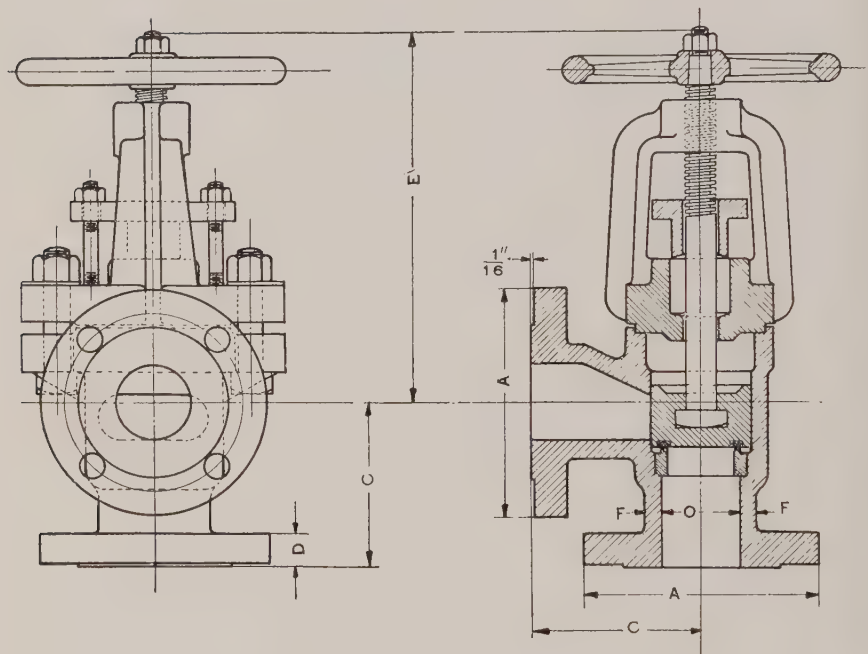


Fig. 4210

Size, inches	A	C	D	E	F	O
2	6½	4¾	7⁄8	11⅞	½	2
2½	7½	5¼	1	12⅞	9⁄16	2½
3	8¼	5¾	1⅛	13⅞	5⁄8	3
3½	9	...	1⅜	...	...	...
4	10	6½	1¼	...	¾	4

For drilling, see page 461.

For price list, see page 144.

FLANGED GLOBE AND ANGLE
REGULATING VALVES FOR
ACCUMULATOR PUMPS
250 POUNDS WORKING STEAM PRESSURE

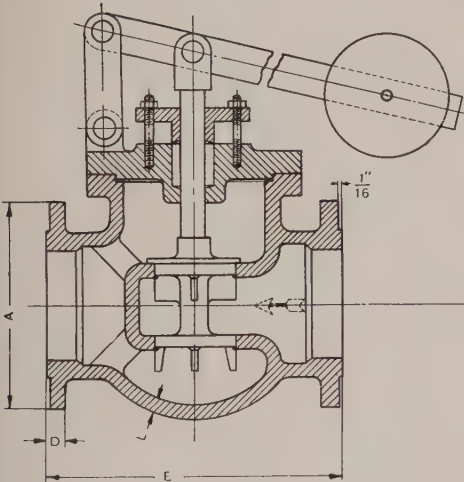


Fig. 4119
Globe Type

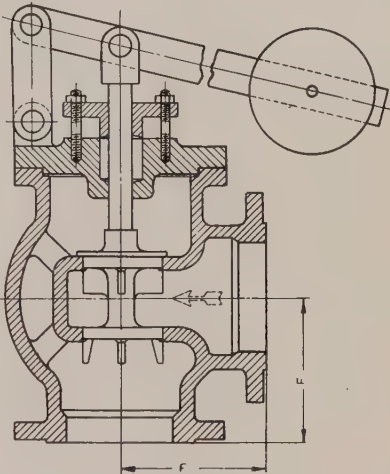


Fig. 4120
Angle Type

Size . . . inches	2	2½	3	4	5	6	7	8	10	12
A	6½	7½	8¼	10	11	12½	14	15	17½	20½
D	⅞	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2
E	9	10½	11	13	14½	17	20	21	25	27
F	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½
L	½	½	⅞	⅝	¾	⅞	⅞	1	1	1⅛

For drilling, see page 461.

BUTTERFLY EMERGENCY VALVES
250 POUNDS WORKING STEAM PRESSURE

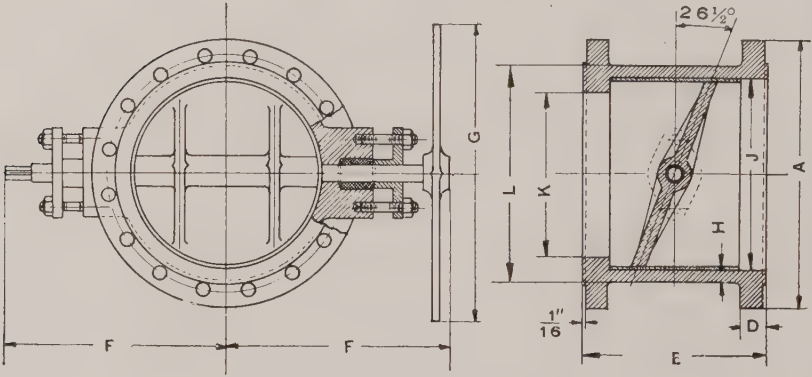


Fig. 4211

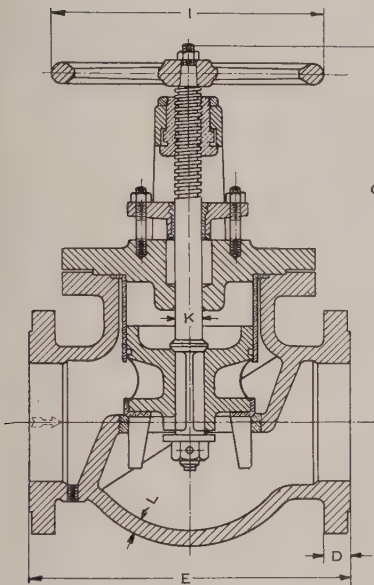
Size Inches	A	D	E	F	G	H	J	K	L
4	10	1 $\frac{1}{4}$	6 $\frac{1}{2}$	9	20	$\frac{1}{2}$	5 $\frac{9}{16}$	4	6 $\frac{9}{16}$
5	11	1 $\frac{3}{8}$	7	9 $\frac{1}{2}$	20	$\frac{9}{16}$	6 $\frac{1}{2}$	5	7 $\frac{5}{8}$
6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	7 $\frac{1}{2}$	10 $\frac{3}{4}$	20	$\frac{5}{8}$	7 $\frac{1}{2}$	6	8 $\frac{3}{4}$
7	14	1 $\frac{1}{2}$	7 $\frac{3}{4}$	12 $\frac{1}{4}$	22	$\frac{11}{16}$	8 $\frac{1}{4}$	7	9 $\frac{5}{8}$
8	15	1 $\frac{5}{8}$	8	13 $\frac{1}{2}$	24	$\frac{11}{16}$	9 $\frac{3}{4}$	8	10 $\frac{1}{8}$
10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	10	14 $\frac{9}{16}$	24	$\frac{13}{16}$	11 $\frac{1}{8}$	10	12 $\frac{3}{4}$
12	20 $\frac{1}{2}$	2	13	16 $\frac{1}{2}$	24	$\frac{7}{8}$	14 $\frac{1}{4}$	12	16
14	23	2 $\frac{1}{8}$	15	18 $\frac{1}{2}$	32	1	15 $\frac{1}{4}$	13 $\frac{1}{4}$	17 $\frac{1}{4}$
15	24 $\frac{1}{2}$	2 $\frac{3}{16}$	16	19 $\frac{1}{2}$	34	1 $\frac{1}{16}$	16 $\frac{1}{2}$	14 $\frac{1}{4}$	18 $\frac{5}{8}$
16	25 $\frac{1}{2}$	2 $\frac{1}{4}$	17	20 $\frac{1}{4}$	36	1 $\frac{1}{16}$	18	15 $\frac{1}{4}$	20 $\frac{1}{8}$
18	28	2 $\frac{3}{8}$	19	22 $\frac{1}{2}$	42	1 $\frac{1}{8}$	20	17 $\frac{1}{4}$	22 $\frac{1}{4}$
20	30 $\frac{1}{2}$	2 $\frac{1}{2}$	21	23 $\frac{1}{2}$	42	1 $\frac{3}{16}$	22	19 $\frac{1}{4}$	24 $\frac{3}{8}$
22	33	2 $\frac{5}{8}$	23	24 $\frac{1}{2}$	42	1 $\frac{1}{4}$	24	21 $\frac{1}{4}$	26 $\frac{1}{2}$
24	36	2 $\frac{3}{4}$	25	27 $\frac{1}{2}$	52	1 $\frac{5}{16}$	26	23 $\frac{1}{4}$	28 $\frac{5}{8}$

For drilling, see page 461.
For price list, see page 145.

FLANGED GLOBE AND ANGLE
BALANCED THROTTLE VALVES

SEMI-STEEL. BRONZE MOUNTED.

250 POUNDS WORKING STEAM PRESSURE



"O" = Number of turns to open

Fig. 4256
Globe Throttle Valve

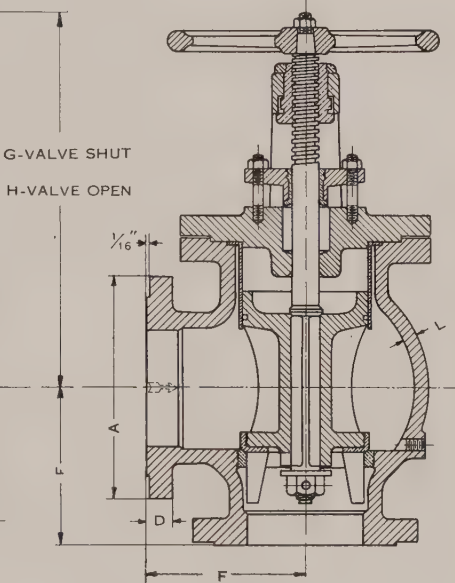


Fig. 4257
Angle Throttle Valve

Size..inches	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
D	7⁄8	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½
F	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½	15	16	17¼
G	11½	13⅝	15⅞	17¼	20	21	23⅞	25	30	32⅜	36½	38	39
H	12⅜	14⅜	16⅞	18⅝	21½	22⅞	25⅞	27¼	32¾	35⅝	40¼	42	43¼
I	6	6	7½	9	12	15	15	18	21	27	32	36	36
K	¾	7⁄8	1	1⅛	1¼	1½	1½	1¾	2	2¼	2½	2¾	2¾
L	½	½	9⁄16	5⁄8	¾	13⁄16	7⁄8	1	1	1⅛	1⅛	1⅜	1¼
O	4⅛	5¼	4	5½	6	6¾	8	9	11	13	15	16	17

For drilling, see page 461.

For price list, see page 148.

REGISTER VALVES

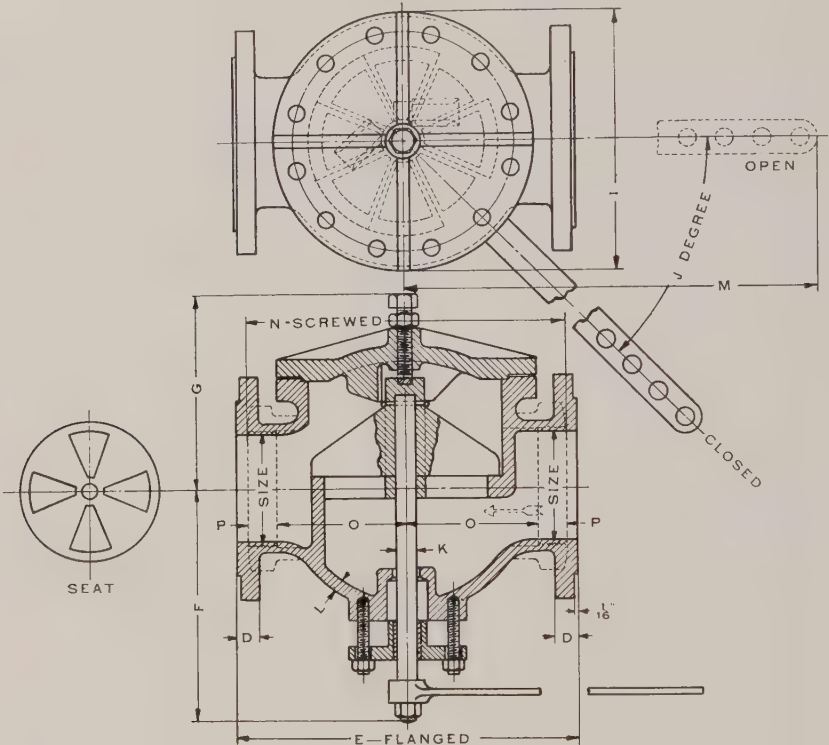


Fig. 9043

"A" = Flange diameter

Size.....inches	A	D	E	F	G	I	J	K	L	M	N	O	P
1½	6	13⁄16	8½	6½	4½	5⅜	60	5⁄8	3⁄8	12	7⅛	211⁄16	7⁄8
2	6½	7⁄8	9½	8	5½	61⁄16	60	11⁄16	3⁄8	14	8½	3¼	1
2½	7½	1	11¾	8	6⅝	7½	60	¾	½	16	10½	4	1¼
3	8¼	1⅛	12	9½	7⅝	8	60	7⁄8	½	18	11	4¾	1⅝
4	10	1¼	15½	12¾	8¾	10¾	60	1⅛	5⁄8	19	14	5⅞	1⅞
5	11	1⅜	17½	13¾	9¼	12⅝	60	1⅛	11⁄16	21	16	6⅞	1⅞
6	12½	1⅞	19½	14½	10¼	14⅝	45	1¼	11⁄16	24	19	7⅞	1⅝

For standard drilling, see page 461.
For price list, see page 149.

EXTRA HEAVY BRONZE COCKS THREWAY

250 POUNDS WORKING STEAM PRESSURE

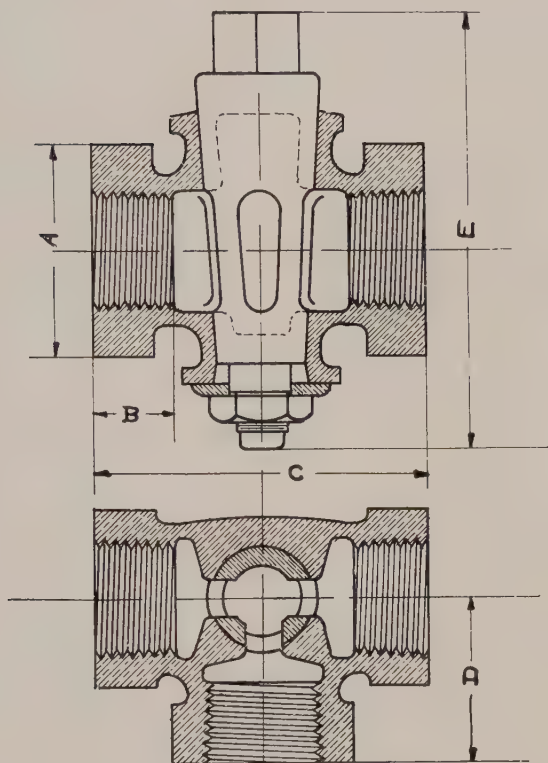


Fig. 4019

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	$1\frac{7}{16}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{9}{16}$	$2\frac{7}{8}$	$3\frac{7}{16}$
B	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	1
C	$2\frac{3}{8}$	$2\frac{9}{16}$	$3\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$5\frac{7}{16}$
D	$1\frac{3}{16}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{7}{8}$	$2\frac{3}{16}$	$2\frac{3}{2}$
E	$3\frac{3}{8}$	$4\frac{1}{4}$	5	6	$6\frac{1}{4}$	$8\frac{3}{8}$

HORIZONTAL STEAM SEPARATORS
EXTRA HEAVY. SEMI-STEEL AND CAST STEEL
250 POUNDS WORKING STEAM PRESSURE - SEMI-STEEL
350 POUNDS WORKING STEAM PRESSURE - CAST STEEL.

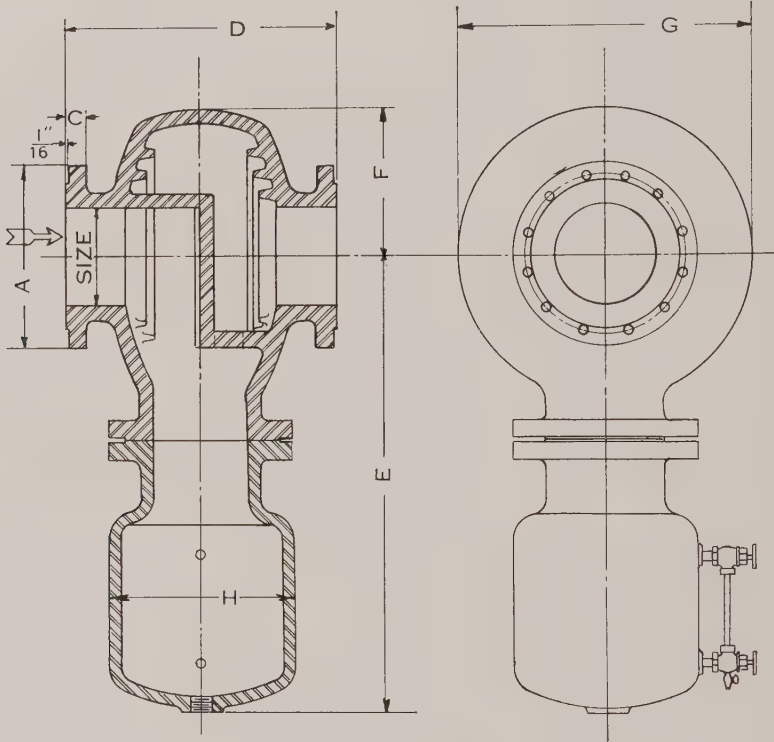


Fig. 4236

Size Inches	4	5	6	7	8	10	12	14	15	16	20
A	10	11	12½	14	15	17½	20½	23	24½	25½	30½
C	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅞	2⅝	2¼	2½
D	15	17	19	22	22	26	29	33	35	38	45
E	31	32½	33¾	38⅞	38⅞	44¼	48⅜	59⅜	61¾	63¾	76½
F	7	8½	9⅝	12	12	14⅞	16½	18⅞	20¾	21¾	27½
G	14	17	19¼	24	24	28¼	33	36¼	41½	43½	55
H	10½	11⅜	13¾	14⅞	14⅞	17	20¼	23½	23½	23½	28¾
Drain	¾	1	1	1¼	1¼	1½	1½	2	2	2	2½

For drilling, see page 461.

For description, see page 151.

For price list, semi-steel, see page 155; cast steel, see page 206.

VERTICAL STEAM SEPARATORS

EXTRA HEAVY. SEMI-STEEL AND CAST STEEL

250 POUNDS WORKING STEAM PRESSURE - SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE - CAST STEEL

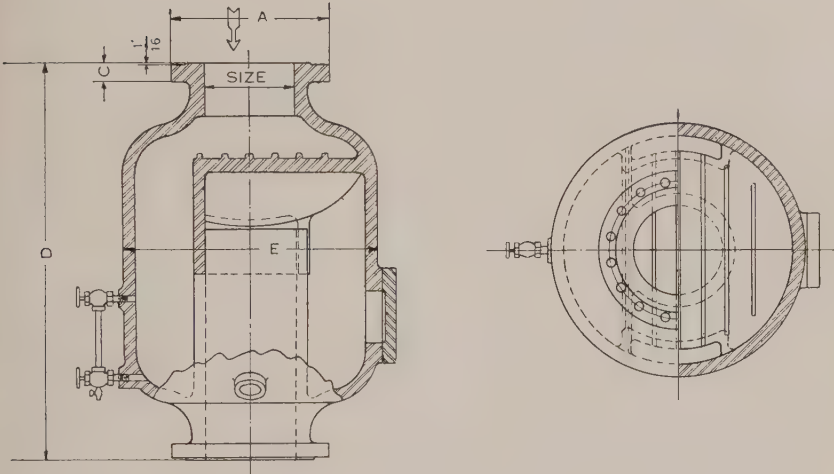


Fig. 4237

Size Inches	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
C	⅞	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼
D	22	24	26	31	33	38	39	41	44	47	50	52	54
E	7½	9	10	13	17⅛	18¾	21⅜	24½	28¼	33	38¼	40½	44
Drain	½	½	¾	1	1	1¼	1¼	1¼	1½	2	2	2	2

For drilling, see page 461.

For description, see page 151.

For price list, semi-steel, see page 155; cast steel, see page 206.

ANGLE STEAM SEPARATORS

EXTRA HEAVY. SEMI-STEEL AND CAST STEEL
TOP INLET. SIDE OUTLET

250 POUNDS WORKING STEAM PRESSURE - SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE - CAST STEEL

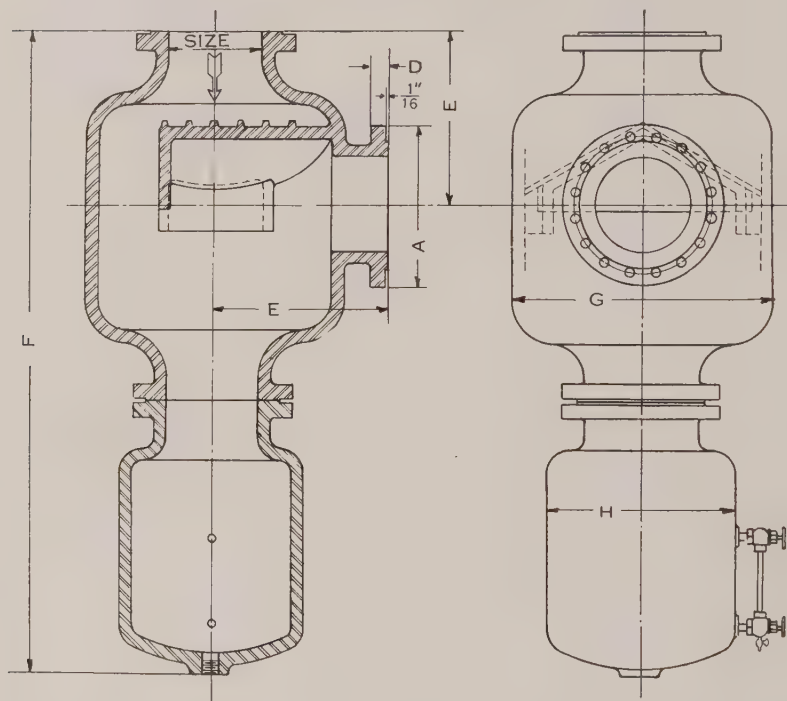


Fig. 4238

Size Inches	3	4	5	6	7	8	10	12	14	15	16
A	8 $\frac{1}{4}$	10	11	12 $\frac{1}{2}$	14	15	17 $\frac{1}{2}$	20 $\frac{1}{2}$	23	24 $\frac{1}{2}$	25 $\frac{1}{2}$
D	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{3}{16}$	2 $\frac{1}{4}$
E	9 $\frac{1}{2}$	9 $\frac{1}{2}$	13	14 $\frac{1}{2}$	14 $\frac{1}{2}$	17	19 $\frac{1}{2}$	22	25	26	28
F	46 $\frac{1}{4}$	52 $\frac{1}{4}$	54 $\frac{1}{2}$	59 $\frac{1}{2}$	59 $\frac{1}{2}$	64 $\frac{1}{8}$	72 $\frac{3}{8}$	84 $\frac{3}{8}$	87 $\frac{3}{4}$	89 $\frac{3}{4}$	99
G	10	13	17 $\frac{1}{8}$	18 $\frac{3}{4}$	21 $\frac{3}{8}$	24 $\frac{1}{2}$	28 $\frac{1}{4}$	33	38 $\frac{1}{4}$	40 $\frac{1}{2}$	44
H	9 $\frac{3}{8}$	10 $\frac{1}{2}$	11 $\frac{3}{8}$	13 $\frac{3}{4}$	13 $\frac{3}{4}$	14 $\frac{7}{8}$	20 $\frac{1}{4}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	28 $\frac{3}{4}$
Drain	$\frac{3}{4}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2	2	2

For drilling, see page 461.

For description, see page 151.

For price list, semi-steel, see page 156; cast steel, see page 207.

ANGLE STEAM SEPARATORS

EXTRA HEAVY. SEMI-STEEL AND CAST STEEL
SIDE INLET. TOP OUTLET.

250 POUNDS WORKING STEAM PRESSURE—SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE—CAST STEEL

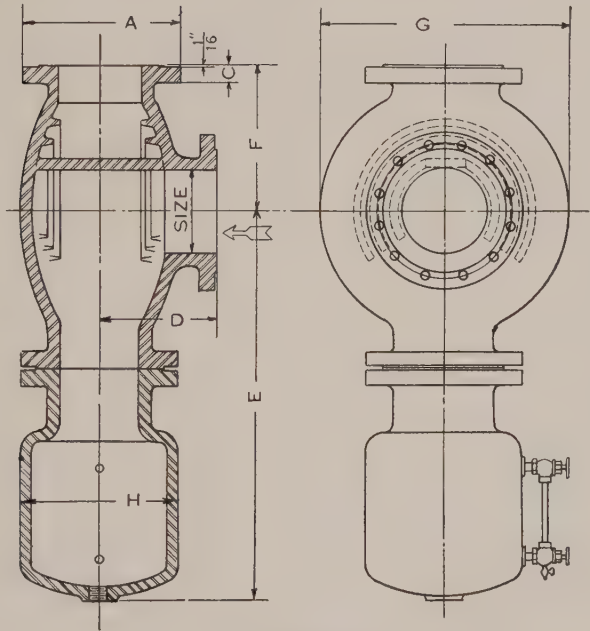


Fig. 4239

Size Inches	3	4	5	6	7	8	10	12	14	15	16	20
A	8¼	10	11	12½	14	15	17½	20½	23	24½	25½	30½
C	1⅞	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅞	2⅝	2¼	2½
D	6	7½	8½	9½	11	11	13	14½	16½	17½	19	22½
E	28	31	32½	33¾	38⅞	38⅞	44¼	48⅜	59⅜	61¾	63¾	76½
F	8½	9¾	10½	12	14	14	17	19	21	24	24	30
G	11⅞	14	17	19¼	24	24	28¼	33	38¼	43½	43½	55
H	9⅜	10½	11⅜	13¾	14⅞	14⅞	17	20¼	23½	23½	23½	28¾
Drain	¾	¾	1	1	1¼	1¼	1½	1½	2	2	2	2½

For drilling, see page 461.

For description, see page 151.

For price list, semi-steel, see page 157; cast steel, see page 208.

STEAM SEPARATORS WITH RECEIVER WELLS

EXTRA HEAVY, SEMI-STEEL AND CAST STEEL HEADS

250 POUNDS WORKING STEAM PRESSURE—SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE—CAST STEEL

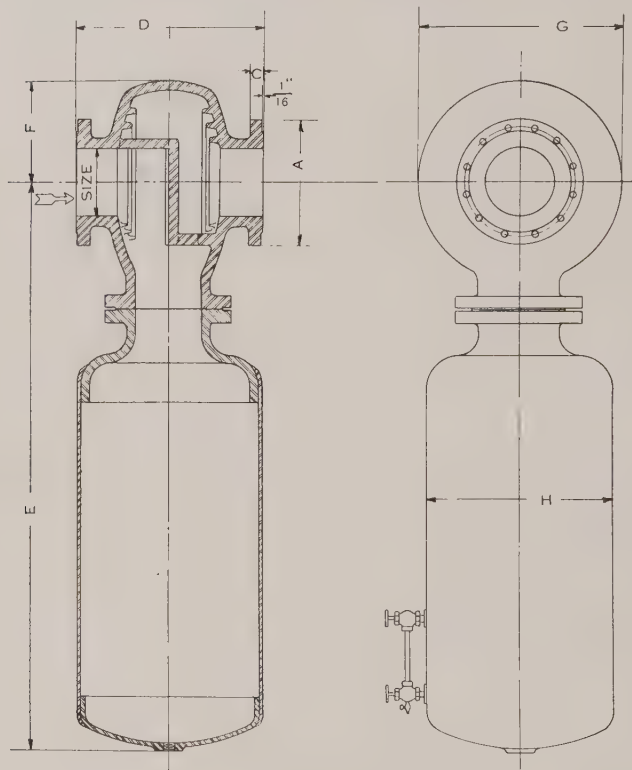


Fig. 4240

Size Inches	3	4	5	6	7	8	10	12	14	16	18	20
A	8 $\frac{1}{4}$	10	11	12 $\frac{1}{2}$	14	15	17 $\frac{1}{2}$	20 $\frac{1}{2}$	23	25 $\frac{1}{2}$	28	30 $\frac{1}{2}$
C	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$
D	12	15	17	19	22	22	26	29	33	38	41	45
E	41	46	51 $\frac{1}{2}$	56 $\frac{1}{4}$	67 $\frac{1}{4}$	67 $\frac{1}{4}$	85	97 $\frac{1}{2}$	108	118	126	130
F	5 $\frac{15}{16}$	7	8 $\frac{1}{2}$	9 $\frac{5}{8}$	11	12	14 $\frac{1}{8}$	16 $\frac{1}{2}$	18 $\frac{1}{8}$	21 $\frac{3}{4}$	24 $\frac{7}{8}$	27 $\frac{1}{2}$
G	11 $\frac{7}{8}$	14	17	19 $\frac{1}{4}$	22	24	28 $\frac{1}{4}$	33	36 $\frac{1}{4}$	43 $\frac{1}{2}$	49 $\frac{3}{4}$	55
H	12 $\frac{3}{4}$	14	16	18	20	22	24	26	28	30	36	42
Drain	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$

For drilling, see page 461.

For description, see page 151.

For price list for semi-steel, see page 158 and for cast steel, see page 209.

ATWOOD WELDED HORIZONTAL
STEAM RECEIVER SEPARATORS

250 POUNDS WORKING STEAM PRESSURE

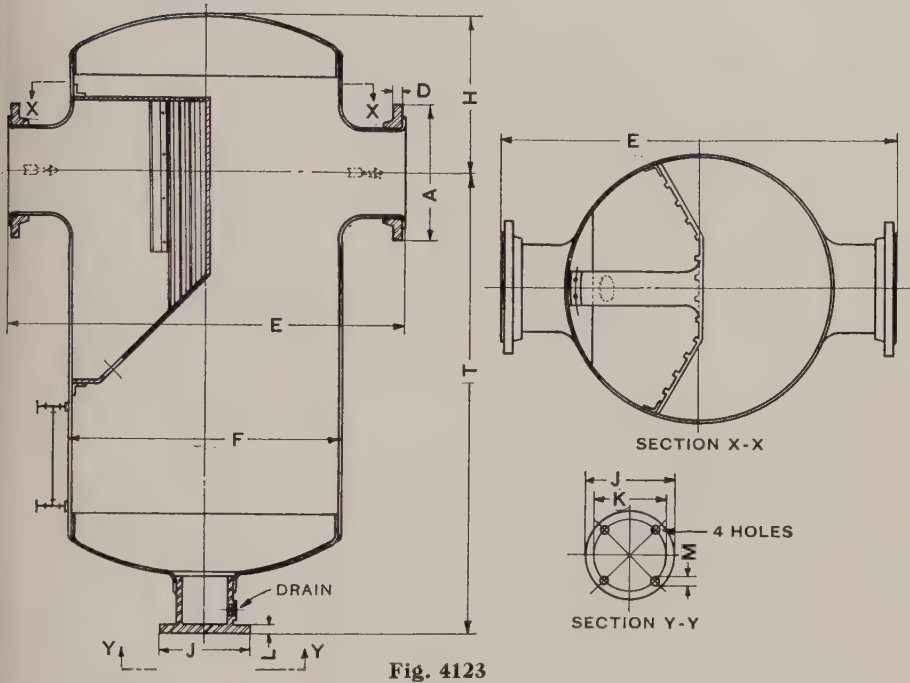


Fig. 4123

Size Inches	A	D	E	F	H	J	K	L	M	T	Drain
6	12½	1¼	41	24	17¼	11	9¼	1⅜	⅞	60¾	1
7	14	1⅝	41	24	18	11	9¼	1⅜	⅞	64	1
8	15	1⅝	45	28	20¼	12½	10⅝	1⅞	⅞	69¼	1¼
9	16¼	1⅞	47	28	21¼	12½	10⅝	1⅞	⅞	72¾	1¼
10	17½	1½	48	30	22	12½	10⅝	1⅞	⅞	73	1½
12	20½	1⅝	54	36	27¾	15	13	1⅝	1	73¼	1½
14	23	1¾	60	42	29½	15	13	1⅝	1	77½	2
16	25½	1⅞	67	48	32½	15	13	1⅝	1	80½	2
18	28	2	75	54	34¼	15	13	1⅝	1	85¾	2½
20	30½	2⅞	84	60	38	17½	15¼	1⅞	1⅞	88	2½
22	33	2¼	90	66	39¾	20½	17¾	2	1¼	92¼	3
24	36	2⅝	96	72	40½	20½	17¾	2	1¼	101½	3

For drilling, see page 461. For description, see page 151. For price list, see page 159.

ATWOOD WELDED VERTICAL STEAM RECEIVER SEPARATORS

TOP INLET. BOTTOM OUTLET.

250 POUNDS WORKING STEAM PRESSURE

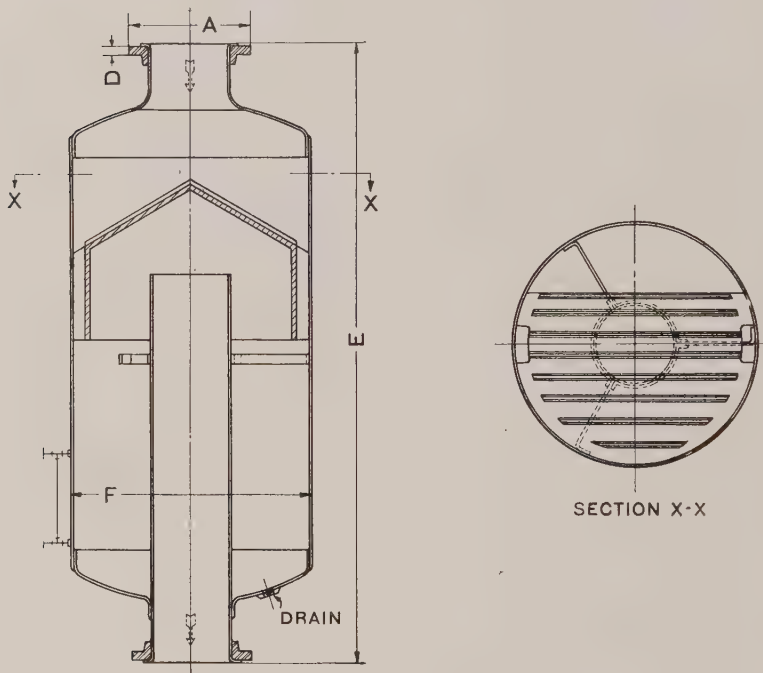


Fig. 4124

Size Inches	A	D	E	F	Drain
6	12½	1¼	88	24	1
7	14	1⅝	92	24	1
8	15	1⅝	99½	28	1¼
9	16¼	1⅞	106	28	1¼
10	17½	1½	106	30	1½
12	20½	1⅝	111	36	1½
14	23	1¾	116½	42	2
16	25½	1⅞	124	48	2
18	28	2	132	54	2½
20	30½	2⅞	141	60	2½
22	33	2¾	148	66	3
24	36	2⅞	157	72	3

For drilling, see page 461. For description, see page 151. For price list, see page 159.

ATWOOD WELDED ANGLE STEAM
RECEIVER SEPARATORS

SIDE INLET. TOP OUTLET.

250 POUNDS WORKING STEAM PRESSURE

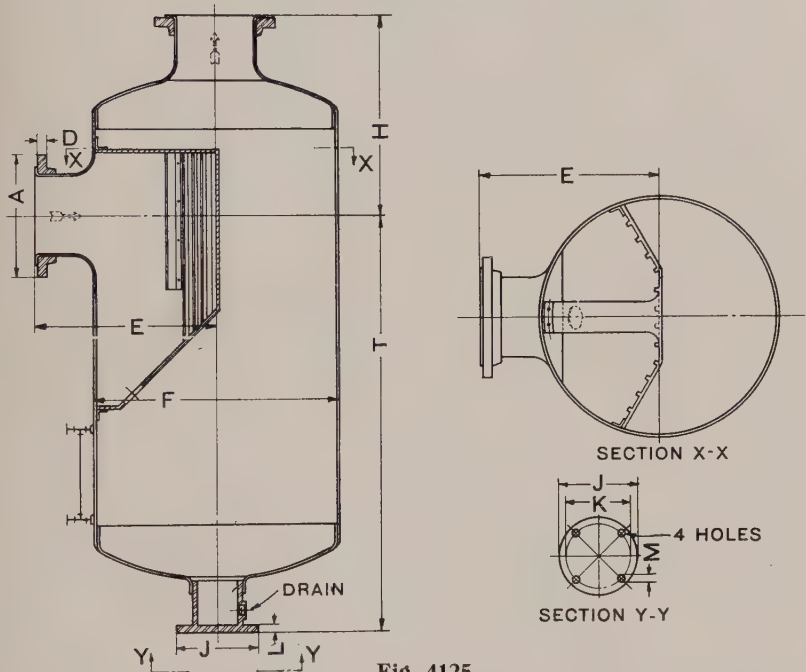


Fig. 4125

Size Inches	A	D	E	F	H	J	K	L	M	T	Drain
6	12½	1¼	20½	24	29	11	9¼	1⅜	⅞	60¾	1
7	14	1⅝	20½	24	29½	11	9¼	1⅜	⅞	64	1
8	15	1⅜	22½	28	30½	12½	10⅝	1⅞	⅞	69¼	1¼
9	16¼	1⅞	23½	28	34	12½	10⅝	1⅞	⅞	72¾	1¼
10	17½	1½	24	30	34	12½	10⅝	1⅞	⅞	73	1½
12	20½	1⅝	27	36	39½	15	13	1⅝	1	73¼	1½
14	23	1¾	30	42	41	15	13	1⅝	1	77½	2
16	25½	1⅞	33½	48	44½	15	13	1⅝	1	80½	2
18	28	2	37½	54	47½	15	13	1⅝	1	85¾	2½
20	30½	2⅛	42	60	53	17½	15¼	1⅞	1⅞	88	2½
22	33	2¼	45	66	55½	20½	17¾	2	1¼	92¼	3
24	36	2⅝	48	72	55½	20½	17¾	2	1¼	101½	3

For drilling, see page 461. For description, see page 151. Prices on application.

ATWOOD WELDED ANGLE STEAM
RECEIVER SEPARATORS

TOP INLET. SIDE OUTLET

250 POUNDS WORKING STEAM PRESSURE

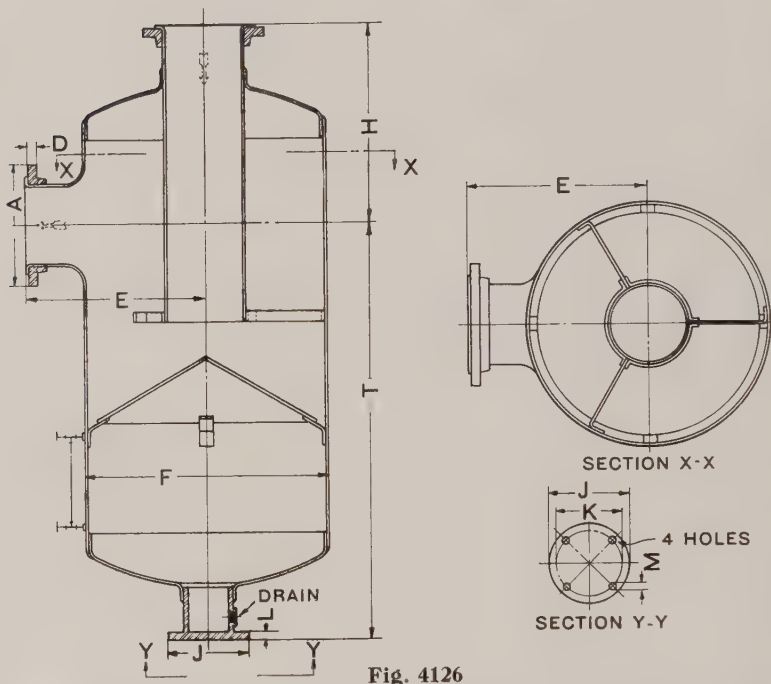


Fig. 4126

Size Inches	A	D	E	F	H	J	K	L	M	T	Drain
6	12½	1¼	20½	24	29	11	9¼	1⅜	⅞	60¾	1
7	14	1⅝	20½	24	29½	11	9¼	1⅜	⅞	64	1
8	15	1⅜	22½	28	30½	12½	10⅝	1⅞	⅞	69¼	1¼
9	16¼	1⅞	23½	28	34	12½	10⅝	1⅞	⅞	72¾	1¼
10	17½	1½	24	30	34	12½	10⅝	1⅞	⅞	73	1½
12	20½	1⅝	27	36	39½	15	13	1⅝	1	73¼	1½
14	23	1¾	30	42	41	15	13	1⅝	1	77½	2
16	25½	1⅞	33½	48	44½	15	13	1⅝	1	80½	2
18	28	2	37½	54	47½	15	13	1⅝	1	85¾	2½
20	30½	2⅛	42	60	53	17½	15¼	1⅞	1⅞	88	2½
22	33	2¼	45	66	55½	20½	17¾	2	1¼	92¼	3
24	36	2⅝	48	72	55½	20½	17¾	2	1¼	101½	3

For drilling, see page 461. For description, see page 151. Prices on application.

DRIP POCKETS

SEMI-STEEL AND CAST STEEL

250 POUNDS WORKING STEAM PRESSURE—SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE—CAST STEEL

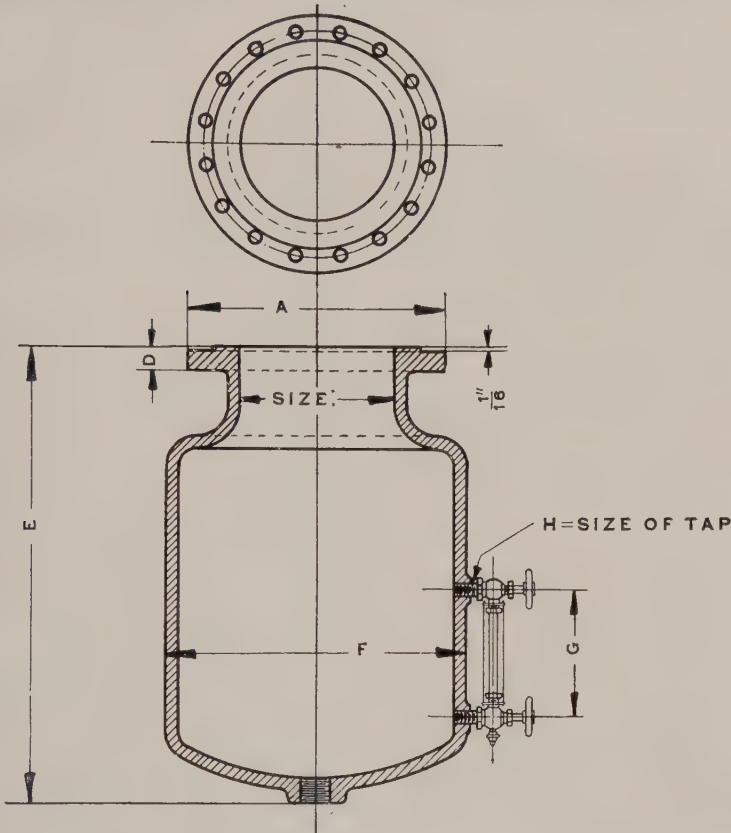


Fig. 4212

Size, inches	3	4	5	6	8	10	12
A	8¼	10	11	12½	15	17½	20½
D	1⅛	1¼	1⅜	1⅞	1⅝	1⅞	2
E	20¼	21¼	21½	21½	23⅛	28⅜	37⅜
F	9⅜	10½	11⅜	13¾	14⅞	20¼	23½
Drain	¾	¾	1	1	1¼	1½	2
G	6	7	8	9	9	9½	10
H	½	½	¾	¾	¾	¾	¾

For drilling, see page 461.

For price list, see page 160 for semi-steel and page 210 for cast steel.

UNBALANCED EXPANSION JOINTS
SEMI-STEEL BRONZE SLIP
250 POUNDS WORKING STEAM PRESSURE

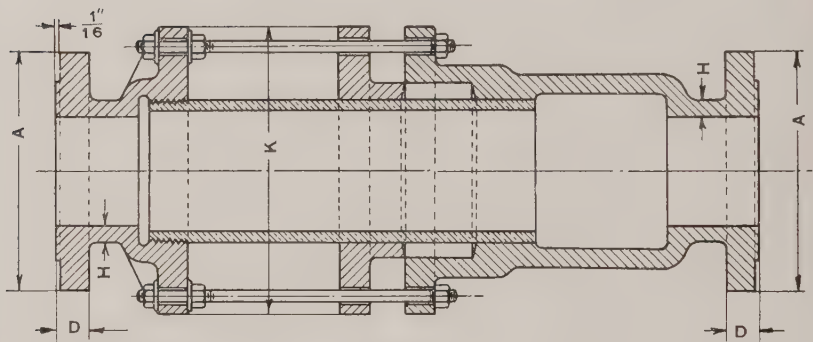


Fig. 4213

Size.....inches	3	4	5	6	7	8	9	10	12	14	15	16	18	20	22	24
A	8 1/4	10	11	12 1/2	14	15	16 1/4	17 1/2	20 1/2	23	24 1/2	25 1/2	28	30 1/2	33	36
D	2 3/8	1 1/4	1 3/8	1 7/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 3/8	2 1/2	2 3/8	2 1/2	2 5/8	2 3/4
Std. Traverse.....	23 1/2	25 1/2	28	31	34	37 1/2	38	39	45	50 1/2	51 1/2	53 1/2	54 1/2	.....	.....	.....
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Std. Traverse.....	26	27	28	29	30	31 1/2	32	33	37	38 1/2	39 1/2	41 1/2	42 1/2	43 1/2	46	48
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4-in. Traverse....	30	31	32	33	34	35 1/2	36	37	41	42 1/2	43 1/2	45 1/2	46 1/2	47 1/2	50	52
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10-in. Traverse...	38	39	40	41	42	43 1/2	44	45	49	50 1/2	51 1/2	53 1/2	54 1/2	55 1/2	58	60
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12-in. Traverse...	42	43	44	45	46	47 1/2	48	49	53	54 1/2	55 1/2	57 1/2	58 1/2	59 1/2	62	64
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14-in. Traverse...	46	47	48	49	50	51 1/2	52	53	57	58 1/2	59 1/2	61 1/2	62 1/2	63 1/2	66	68
Length Open	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16-in. Traverse...	50	51	52	53	54	55 1/2	56	57	61	62 1/2	63 1/2	65 1/2	66 1/2	67 1/2	70	72
H	5/8	11/16	3/4	13/16	7/8	1	1 1/16	1 1/8	1 1/2	1 3/8	1 1/2	1 5/8	1 3/4	1 1/2	1 5/8	1 11/16
K	9 1/4	11 1/4	12 1/4	14	15	16	18	19	22 3/4	25	26 1/2	29 1/4	31 1/2	34	36 1/2	38 1/2

Read carefully, "Notes on Expansion," page 161.
For drilling, see page 461.
For description, see page 161.
For price list, see page 162.

BALANCED EXPANSION JOINTS

SEMI-STEEL

250 POUNDS WORKING STEAM PRESSURE

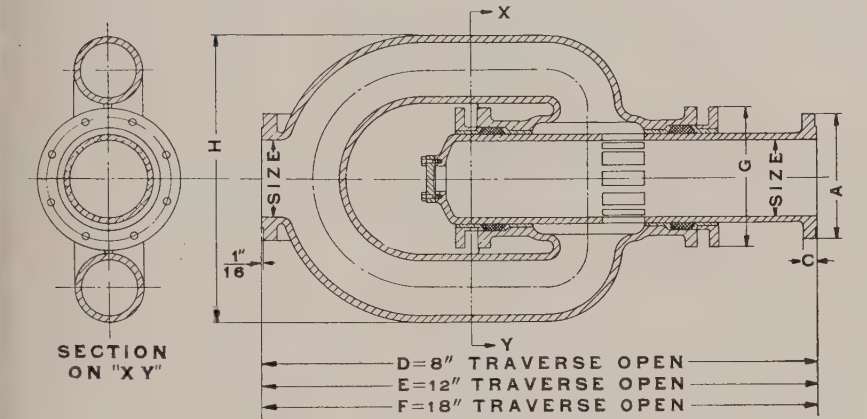


Fig. 4214

Size Inches	A	C	D	E	F	G	H
4	10	1 $\frac{1}{4}$	56 $\frac{1}{8}$	64 $\frac{1}{8}$	76 $\frac{1}{8}$	11 $\frac{1}{2}$	19 $\frac{3}{4}$
6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	63	75	93	14	25
8	15	1 $\frac{5}{8}$	65 $\frac{3}{4}$	77 $\frac{3}{4}$	95 $\frac{3}{4}$	15 $\frac{1}{4}$	31
10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	71 $\frac{1}{4}$	83 $\frac{1}{4}$	101 $\frac{1}{4}$	19 $\frac{1}{4}$	40
12	20 $\frac{1}{2}$	2	74 $\frac{3}{4}$	86 $\frac{3}{4}$	104 $\frac{3}{4}$	21	42 $\frac{7}{8}$
14	23	2 $\frac{1}{8}$	86 $\frac{5}{8}$	98 $\frac{5}{8}$	116 $\frac{5}{8}$	24 $\frac{3}{8}$	50
15	24 $\frac{1}{2}$	2 $\frac{3}{16}$	95 $\frac{1}{4}$	107 $\frac{1}{4}$	125 $\frac{1}{4}$	27	55 $\frac{1}{4}$
16	25 $\frac{1}{2}$	2 $\frac{1}{4}$	95 $\frac{1}{4}$	107 $\frac{1}{4}$	125 $\frac{1}{4}$	27	55 $\frac{1}{4}$
18	28	2 $\frac{3}{8}$	100 $\frac{3}{8}$	112 $\frac{3}{8}$	130 $\frac{3}{8}$	29 $\frac{1}{4}$	61 $\frac{3}{4}$
20	30 $\frac{1}{2}$	2 $\frac{1}{2}$	105 $\frac{5}{8}$	117 $\frac{5}{8}$	135 $\frac{5}{8}$	31 $\frac{1}{2}$	68 $\frac{1}{2}$
22	33	2 $\frac{5}{8}$	109 $\frac{1}{2}$	121 $\frac{1}{2}$	139 $\frac{1}{2}$	34	73 $\frac{3}{4}$
24	36	2 $\frac{3}{4}$	118 $\frac{1}{8}$	130 $\frac{1}{8}$	148 $\frac{1}{8}$	36 $\frac{1}{2}$	79 $\frac{1}{2}$

For drilling, see page 461.
For description, see page 161.
For price list, see page 164.

SWIVEL JOINTS

SEMI-STEEL BODY. BRONZE MOUNTED

250 POUNDS WORKING STEAM PRESSURE

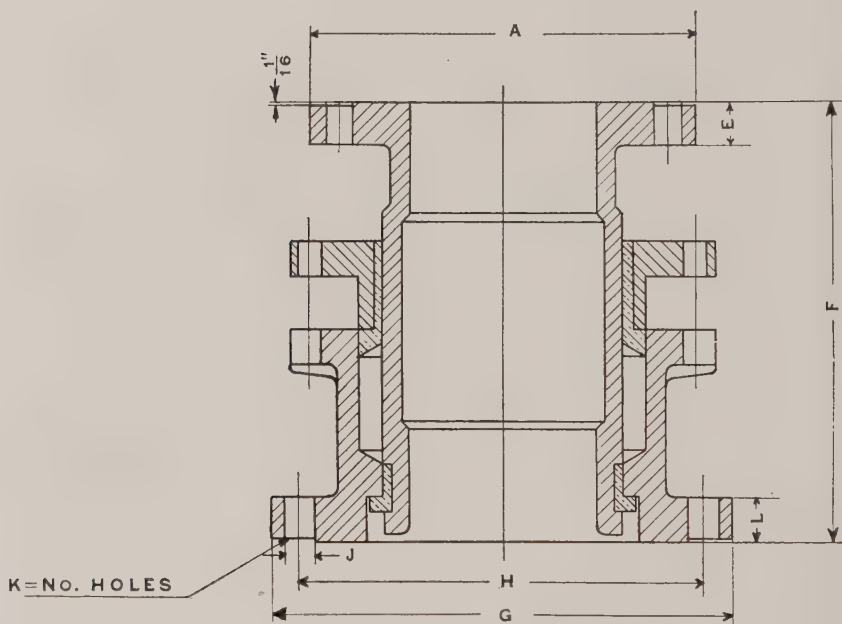


Fig. 4215

Size Inches	3	4	5	6	8	10	12	14	16	18	20	22	24
A	8 $\frac{1}{4}$	10	11	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20 $\frac{1}{2}$	23	25 $\frac{1}{2}$	28	30 $\frac{1}{2}$	33	36
E	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$
F	11	12	12 $\frac{1}{4}$	14	14 $\frac{1}{2}$	16	17	18	20 $\frac{1}{2}$	20 $\frac{3}{4}$	21	21 $\frac{1}{2}$	21 $\frac{3}{4}$
G	10 $\frac{1}{2}$	11	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20 $\frac{1}{2}$	23	25 $\frac{1}{2}$	28	30 $\frac{1}{2}$	33	36	38 $\frac{1}{4}$
H	8 $\frac{1}{2}$	9 $\frac{1}{4}$	10 $\frac{5}{8}$	13	15 $\frac{1}{4}$	17 $\frac{3}{4}$	20 $\frac{1}{4}$	22 $\frac{1}{2}$	24 $\frac{3}{4}$	27	29 $\frac{1}{4}$	32	34 $\frac{1}{2}$
J	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$
K	8	8	12	12	16	16	20	20	24	24	24	24	28
L	1 $\frac{5}{16}$	1 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	2 $\frac{13}{16}$

This type of swivel joint requires one special flange.

For drilling, see page 461.

For description, see page 161.

For price list, see page 165.

EXTRA HEAVY FLANGED FITTINGS
SEMI-STEEL AND CAST STEEL

SEMI-STEEL - 250 POUNDS WORKING STEAM PRESSURE
CAST STEEL - 350 POUNDS WORKING STEAM PRESSURE

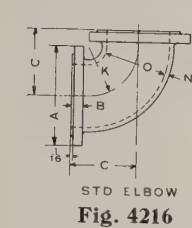


Fig. 4216

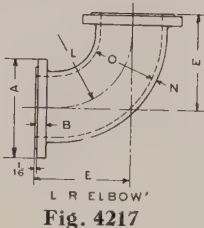


Fig. 4217

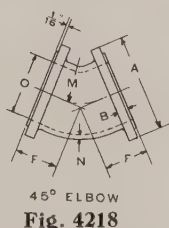


Fig. 4218

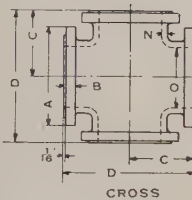


Fig. 4219

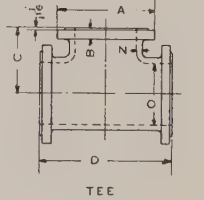


Fig. 4220

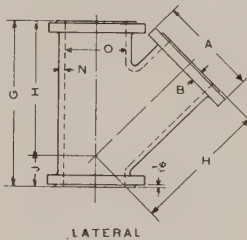


Fig. 4221

Size Inches	A	B	C	D	E	F	G	H	J	K	L	M	N	O
1	4 1/2	11 1/16	4	8	5	2	8 1/2	6 1/2	2	2 1/2	3	2	1 1/2	1
1 1/4	5	13 3/4	4 1/4	8 1/2	5 1/2	2 1/2	9 1/2	7 1/4	2 1/4	2 3/4	3 1/2	2 1/4	1 1/2	1 1/4
1 1/2	6	15 1/8	4 1/2	9	6	2 3/4	11	8 1/2	2 1/2	3	4	2 3/4	1 1/2	1 1/2
2	6 1/2	17 1/8	5	10	6 1/2	3	11 1/2	9	2 1/2	3 1/4	4 1/4	3 1/4	1 1/2	2
2 1/2	7 1/2	19 1/8	5 1/2	11	7	3 1/2	13	10 1/2	2 1/2	3 3/4	4 5/8	3 3/4	1 1/2	2 1/2
3	8 1/4	21 1/8	6	12	7 3/4	3 1/2	14	11	3	4 1/8	5 1/4	4 1/8	1 1/2	3
3 1/2	9	23 1/8	6 1/2	13	8 1/2	4	15 1/2	12 1/2	3	4 1/2	6	4 1/2	1 1/2	3 1/2
4	10	25 1/8	7	14	9	4 1/2	16 1/2	13 1/2	3	5	6 1/4	5	1 1/2	4
4 1/2	10 1/2	27 1/8	7 1/2	15	9 1/2	4 1/2	18	14 1/2	3 1/2	5 1/4	6 3/4	5 1/4	1 1/2	4 1/2
5	11	29 1/8	8	16	10 1/4	5	18 1/2	15	3 1/2	5 1/2	7 1/4	5 1/2	1 1/2	5
6	12 1/2	31 1/8	8 1/2	17	11 1/2	5 1/2	21 1/2	17 1/2	4	6 1/4	8 1/2	6 1/4	1 1/2	6
7	14	33 1/8	9	18	12 3/4	6	23 1/2	19	4 1/2	7	9 3/4	7	1 1/2	7
8	15	35 1/8	10	20	14	6	25 1/2	20 1/2	5	7 1/2	10 1/2	7 1/2	1 1/2	8
9	16 1/4	37 1/8	10 1/2	21	15 1/4	6 1/2	27 1/2	22 1/2	5	8	11 1/2	8	1 1/2	9
10	17 1/2	39 1/8	11 1/2	23	16 1/2	7	29 1/2	24	5 1/2	8 3/4	12 1/4	8 3/4	1 1/2	10
12	20 1/2	45 1/8	13	26	19	8	33 1/2	27 1/2	6	10	15	10	1 1/2	12

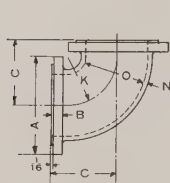
For dimensions of larger sizes, see page 442.
Cast Steel Fittings have same general dimensions as above table.
For drilling see page 461.
For description, see page 22.
For semi-steel price list, see pages 166 to 173.
For cast steel price list, see pages 211 to 219.
Dimensions of Side Outlet Fittings are same as shown above.

EXTRA HEAVY FLANGED FITTINGS

SEMI-STEEL AND CAST STEEL

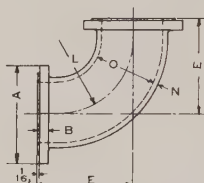
SEMI-STEEL - 250 POUNDS WORKING STEAM PRESSURE

CAST STEEL - 350 POUNDS WORKING STEAM PRESSURE



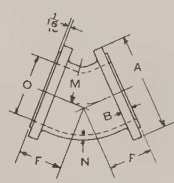
STD. ELBOW

Fig. 4250



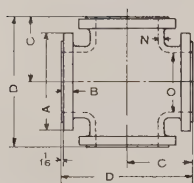
L. R. ELBOW

Fig. 4251



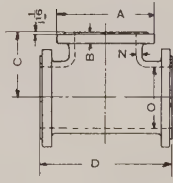
45° ELBOW

Fig. 4252



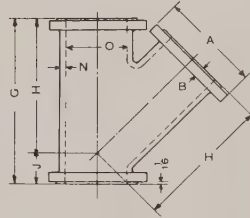
CROSS.

Fig. 4253



TEE.

Fig. 4254



LATERAL

Fig. 4255

Size Inches	A	B	C	D	E	F	G	H	J	K	L	M	N	O
14	23	21 ¹ / ₈	15	30	21 ¹ / ₂	8 ¹ / ₂	37 ¹ / ₂	31	6 ¹ / ₂	11 ¹ / ₄	17	11 ¹ / ₄	1 ¹ / ₈	14
15	24 ¹ / ₂	23 ³ / ₁₆	15 ¹ / ₂	31	22 ³ / ₄	9	39 ¹ / ₂	33	6 ¹ / ₂	11 ³ / ₄	18 ¹ / ₂	11 ³ / ₄	1 ³ / ₁₆	15
16	25 ¹ / ₂	2 ³ / ₄	16 ¹ / ₂	33	24	9 ¹ / ₂	42	34 ¹ / ₂	7 ¹ / ₂	12 ¹ / ₂	19 ¹ / ₂	12 ¹ / ₂	1 ¹ / ₄	16
18	28	2 ³ / ₈	18	36	26 ¹ / ₂	10	45 ¹ / ₂	37 ¹ / ₂	8	13 ¹ / ₂	22	13 ¹ / ₂	1 ³ / ₈	18
20	30 ¹ / ₂	2 ¹ / ₂	19 ¹ / ₂	39	29	10 ¹ / ₂	49	40 ¹ / ₂	8 ¹ / ₂	14 ³ / ₄	24	14 ³ / ₄	1 ¹ / ₂	20
22	33	2 ⁵ / ₈	20 ¹ / ₂	41	31 ¹ / ₂	11	53	43 ¹ / ₂	9 ¹ / ₂	15 ³ / ₄	26 ¹ / ₂	15 ³ / ₄	1 ⁹ / ₁₆	22
24	36	2 ³ / ₄	22 ¹ / ₂	45	34	12	57 ¹ / ₂	47 ¹ / ₂	10	17	29	17	1 ⁵ / ₈	24
26	38 ¹ / ₄	2 ¹⁵ / ₁₆	24	48	36 ¹ / ₂	13	.....	.....	.....	18 ¹ / ₈	32	18 ¹ / ₄	1 ³ / ₁₆	26
28	40 ³ / ₄	2 ¹⁵ / ₁₆	26	52	39	14	.....	.....	.....	19 ¹ / ₄	34 ¹ / ₂	19 ¹ / ₄	1 ⁷ / ₈	28
30	43	3	27 ¹ / ₂	55	41 ¹ / ₂	15	.....	.....	.....	20	37	20 ¹ / ₂	2	30
32	45 ¹ / ₄	3 ¹ / ₈	29	58	44	16	.....	.....	.....	20 ¹ / ₂	39 ¹ / ₂	21 ³ / ₄	2 ¹ / ₈	32
34	47 ¹ / ₂	3 ¹ / ₄	30 ¹ / ₂	61	46 ¹ / ₂	17	.....	.....	.....	21 ³ / ₄	42	22 ³ / ₄	2 ¹ / ₄	34
36	50	3 ³ / ₈	32 ¹ / ₂	65	49	18	.....	.....	.....	22 ³ / ₄	44 ¹ / ₂	24	2 ³ / ₈	36
40	54 ¹ / ₂	3 ⁹ / ₁₆	35 ¹ / ₂	71	54	20	.....	.....	.....	25	49 ¹ / ₂	26 ¹ / ₄	2 ⁹ / ₁₆	40
42	57	3 ¹¹ / ₁₆	37	74	56 ¹ / ₂	21	.....	.....	.....	26 ¹ / ₄	52	27 ¹ / ₂	2 ¹¹ / ₁₆	42
48	65	4	42	84	64	24	.....	.....	.....	29 ³ / ₄	59 ¹ / ₂	31	3	48

Cast Steel Fittings have the same general dimensions as above table.

For drilling, see page 461.

For description, see page 22.

For semi-steel price list, see pages 166 to 173.

For cast steel price list see pages 211 to 219.

Dimensions for Side Outlet Fittings are same as shown above.

For dimensions of smaller sizes, see page 441.

EXTRA HEAVY FLANGED FITTINGS
GENERAL DIMENSIONS REDUCING TEES AND CROSSES
SHORT BODY PATTERN

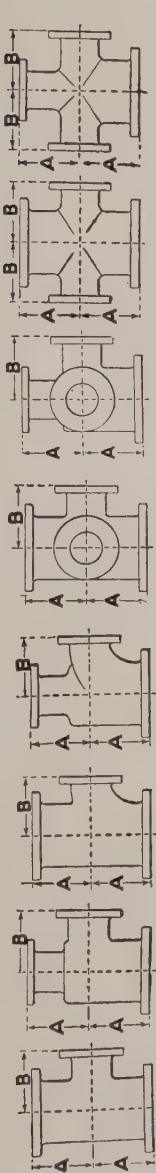


Fig. 4128 Tee
Fig. 4129 Reducing Tee
Fig. 4130 Single Sweep Tee
Fig. 4131 Reducing Single Sweep Tee
Fig. 4132 Side Outlet Tee
Fig. 4133 Reducing Side Outlet Tee
Fig. 4134 Cross
Fig. 4135 Reducing Cross

All reducing fittings 1 inch to 16 inch, inclusive, have the same center to face dimensions as straight size fittings.

Size	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
*Size of Outlet and Smaller	12	14	15	16	18	18	20	20	22	24	24	26	28	28	30	32
AA—Face to Face, Run	28	31	33	34	38	38	41	41	44	47	47	50	53	53	55	58
A—Center to Face, Run	14	15 1/2	16 1/2	17	19	19	20 1/2	20 1/2	22	23 1/2	23 1/2	25	26 1/2	26 1/2	27 1/2	29
B—Center to Face, Outlet	17	18 1/2	20	21 1/2	23	24	25 1/2	26 1/2	28	29 1/2	30 1/2	31 1/2	33 1/2	34 1/2	35 1/2	37 1/2

*LONG BODY PATTERNS are used when outlets are larger than given in the above table, therefore, have same dimensions as straight size fittings.

The dimensions of "Reducing Flanged Fittings" are always regulated by the reduction of the outlet. FITTINGS REDUCING ON THE RUN ONLY, the long body pattern will always be used, except Double Sweep Tees, on which the reduced end is always longer than the regular fittings. Dimensions on request.

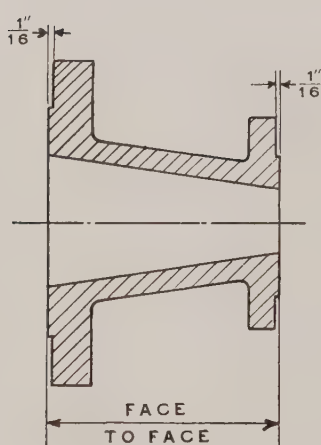
BULL HEADS OR TEES having outlets larger than the run, will be same length center to face of all openings as a Tee with all openings of the size of the outlet. For example, a 12 x 12 x 18-inch Tee will be governed by the dimensions of the 18-inch Long Body Tee, namely, 18 inches center to face of all openings and 36 inches face to face. REDUCING ELBOWS carry same center to face dimension as regular elbows of largest straight size.

EXTRA HEAVY FLANGED REDUCERS

SEMI-STEEL AND CAST STEEL

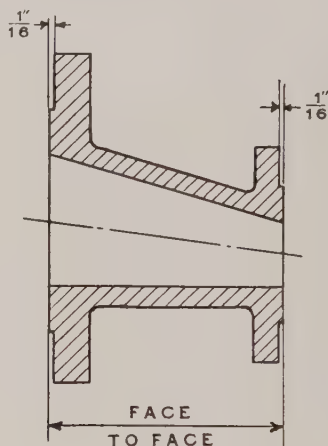
250 POUNDS WORKING STEAM PRESSURE—SEMI STEEL

350 POUNDS WORKING STEAM PRESSURE—CAST STEEL



TAPER REDUCER

Fig. 4222



ECCENTRIC REDUCER

Fig. 4223

Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face	Size Inches	Face to Face
2½ x 2	...	7 x 4	10	14 x 6	16	18 x 16	19
3 x 2	6	7 x 5	10	14 x 8	16	20 x 12	20
3½ x 2½	6½	7 x 6	10	14 x 10	16	20 x 14	20
4 x 2	7	8 x 3	11	14 x 12	16	20 x 16	20
4 x 2½	7	8 x 4	11	15 x 8	17	20 x 18	20
4 x 3	7	8 x 5	11	15 x 10	17	22 x 14	22
5 x 2	8	8 x 6	11	15 x 12	17	22 x 16	22
5 x 2½	8	10 x 4	12	15 x 14	17	22 x 18	22
5 x 3	8	10 x 5	12	16 x 8	18	22 x 20	22
5 x 4	8	10 x 6	12	16 x 10	18	24 x 16	24
6 x 3	9	10 x 8	12	16 x 12	18	24 x 18	24
6 x 3½	9	12 x 5	14	16 x 14	18	24 x 20	24
6 x 4	9	12 x 6	14	18 x 10	19	24 x 22	24
6 x 5	9	12 x 8	14	18 x 12	19	.....	..
7 x 3	10	12 x 10	14	18 x 14	19	.....	..

For drilling, see page 461.

For semi-steel price list, see page 174.

Prices of cast steel on application.

EXTRA HEAVY SEMI-STEEL SCREWED FITTINGS

250 POUNDS WORKING STEAM PRESSURE

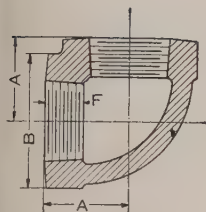


Fig. 408
90° Elbow

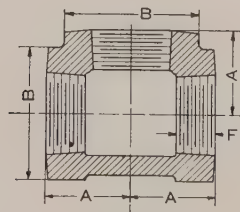


Fig. 409
Tee

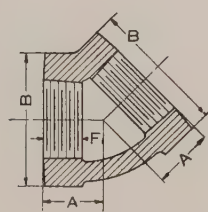


Fig. 410
45° Elbow

Size Inches	A	B	F	Size Inches	A	B	F	Size Inches	A	B	F
1/4	13/16	1 3/16	7/16	1/4	13/16	1 3/16	7/16	1/4	11/16	1 3/16	7/16
3/8	15/16	1 5/16	1 1/2	3/8	15/16	1 5/16	1 1/2	3/8	3/4	1 5/16	1 1/2
1/2	1 1/8	1 5/8	9/16	1/2	1 1/8	1 5/8	9/16	1/2	7/8	1 5/8	9/16
3/4	1 3/8	1 7/8	5/8	3/4	1 3/8	1 7/8	5/8	3/4	1	1 7/8	5/8
1	1 9/16	2 5/16	11/16	1	1 9/16	2 5/16	11/16	1	1 1/8	2 5/16	11/16
1 1/4	1 3/4	2 11/16	3/4	1 1/4	1 3/4	2 11/16	3/4	1 1/4	1 1/4	2 11/16	3/4
1 1/2	1 15/16	3	7/8	1 1/2	1 15/16	3	7/8	1 1/2	1 3/8	3	7/8
2	2 1/4	3 11/16	1	2	2 1/4	3 11/16	1	2	1 5/8	3 11/16	1
2 1/2	2 13/16	4 1/2	1 1/4	2 1/2	2 13/16	4 1/2	1 1/4	2 1/2	2	4 1/2	1 1/4
3	3 3/8	5 5/16	1 5/16	3	3 3/8	5 5/16	1 5/16	3	2 1/4	5 5/16	1 5/16
3 1/2	3 3/4	5 15/16	1 3/8	3 1/2	3 3/4	5 15/16	1 3/8	3 1/2	2 1/16	5 15/16	1 3/8
4	4 1/16	6 3/4	1 7/16	4	4 1/16	6 3/4	1 7/16	4	2 11/16	6 3/4	1 7/16
4 1/2	4 1/2	7 5/16	1 1/2	4 1/2	4 1/2	7 5/16	1 1/2	4 1/2	2 13/16	7 5/16	1 1/2
5	4 11/16	7 7/8	1 9/16	5	4 11/16	7 7/8	1 9/16	5	3 1/16	7 7/8	1 9/16
6	5 5/16	9 1/4	1 5/8	6	5 5/16	9 1/4	1 5/8	6	3 3/8	9 1/4	1 5/8
7	5 15/16	10 1/4	1 3/4	7	5 15/16	10 1/4	1 3/4	7	3 5/8	10 1/4	1 3/4
8	6 11/16	11 1/2	1 7/8	8	6 11/16	11 1/2	1 7/8	8	3 7/8	11 1/2	1 7/8
9	7 7/16	12 1/2	1 15/16	9	7 7/16	12 1/2	1 15/16	9	4 7/16	12 1/2	1 15/16
10	8 1/2	13 5/8	2 1/16	10	8 1/2	13 5/8	2 1/16	10	5 1/16	13 5/8	2 1/16
12	9 5/8	16 3/8	2 1/4	12	9 5/8	16 3/8	2 1/4	12	5 1/2	16 3/8	2 1/4

For price list, see page 175.

EXTRA HEAVY BRONZE SCREWED FITTINGS

250 POUNDS WORKING STEAM PRESSURE

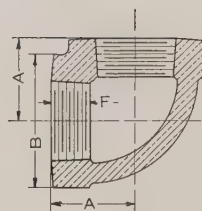


Fig. 411
90° Elbow

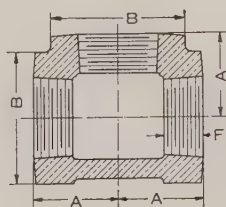


Fig. 412
Tee

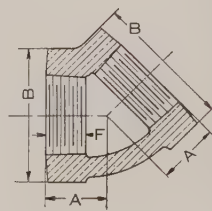


Fig. 113
45° Elbow

Size Inches	A	B	F	Size Inches	A	B	F	Size Inches	A	B	F
1/4	13/16	1	7/16	1/4	13/16	1	7/16	1/4	11/16	1	7/16
3/8	15/16	1 1/8	1/2	3/8	15/16	1 1/8	1/2	3/8	3/4	1 1/8	1/2
1/2	1 1/8	1 7/16	9/16	1/2	1 1/8	1 7/16	9/16	1/2	7/8	1 7/16	9/16
3/4	1 3/8	1 3/4	5/8	3/4	1 3/8	1 3/4	5/8	3/4	1	1 3/4	5/8
1	1 9/16	2 1/16	11/16	1	1 9/16	2 1/16	11/16	1	1 1/8	2 1/16	11/16
1 1/4	1 3/4	2 7/16	3/4	1 1/4	1 3/4	2 7/16	3/4	1 1/4	1 1/4	2 7/16	3/4
1 1/2	1 15/16	2 3/4	7/8	1 1/2	1 15/16	2 3/4	7/8	1 1/2	1 3/8	2 3/4	7/8
2	2 1/4	3 11/32	1	2	2 1/4	3 11/32	1	2	1 5/8	3 11/32	1
2 1/2	2 13/16	4 1/16	1 1/4	2 1/2	2 13/16	4 1/16	1 1/4	2 1/2	2	4 1/16	1 1/4
3	3 3/8	4 3/4	1 5/16	3	3 3/8	4 3/4	1 5/16	3	2 1/4	4 3/4	1 5/16
3 1/2	3 3/4	5 3/8	1 3/8	3 1/2	3 3/4	5 3/8	1 3/8	3 1/2	2 7/16	5 3/8	1 3/8
4	4 1/16	6	1 7/16	4	4 1/16	6	1 7/16	4	2 11/16	6	1 7/16

For price list, see page 176.

EXTRA HEAVY SEMI-STEEL AND CAST
STEEL SCREWED FLANGES

250 POUNDS WORKING STEAM PRESSURE — SEMI-STEEL
350 POUNDS WORKING STEAM PRESSURE — CAST STEEL

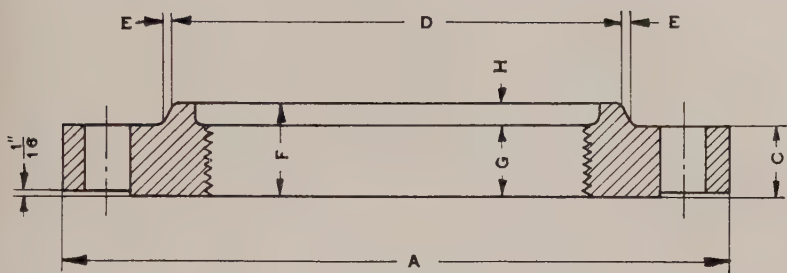


Fig. 4224

Size Inches	A	C	D	E	F	G	H
1	4½	11/16	2 1/16	1/8	1	11/16	5/16
1¼	5	3/4	2 7/16	1/8	1 1/8	1 1/16	1/2
1½	6	13/16	2 3/4	1/8	1 1/4	1 3/4	1 1/2
2	6 1/2	7/8	3 1/8	1/8	1 3/8	1 3/4	5/8
2½	7 1/2	1	3 3/4	1/8	1 1/2	1 7/8	3/8
3	8 1/4	1 1/8	4 5/8	1/8	1 5/8	1 7/8	7/16
3½	9	1 3/16	5 1/8	1/8	1 11/16	1 7/8	7/16
4	10	1 1/4	5 5/8	1/8	1 3/4	1 5/8	7/16
4½	10 1/2	1 5/16	6 1/8	1/8	1 13/16	1 3/8	7/16
5	11	1 3/8	6 3/4	1/8	1 7/8	1 3/8	1 1/2
6	12 1/2	1 7/16	8	1/8	1 15/16	1 1/2	1 1/8
7	14	1 1/2	9	1/8	2	1 5/8	3/8
8	15	1 5/8	10 1/8	3/16	2 1/8	1 11/16	7/16
9	16 1/4	1 3/4	11 1/8	3/16	2 1/4	1 9/16	7/16
10	17 1/2	1 7/8	12 3/8	3/16	2 3/8	1 5/8	7/16
12	20 1/2	2	14 1/2	1/4	2 9/16	2 1/8	7/16
14	23	2 1/8	16	1/4	2 11/16	2 3/4	7/16
15	24 1/2	2 3/16	17 1/8	1/4	2 5/8	2 3/8	7/16
16	25 1/2	2 1/4	18 1/4	1/4	2 7/8	2 7/16	7/16
18	28	2 3/8	20 1/4	1/4	3 1/16	2 5/8	7/16
20	30 1/2	2 1/2	22 3/8	1/4	3 1/4	2 7/8	3/8

For drilling, see page 461.

For description, see page 43.

For price list, see page 178 for screwed flanges only.

For male and female flanges, see page 448.

These flanges are also used for the Atwood Lap, When used for this service the cross section is as shown except the bore and raised face.

EXTRA HEAVY SEMI-STEEL AND CAST
STEEL SCREWED FLANGES

MALE AND FEMALE

250 POUNDS WORKING STEAM PRESSURE — SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE — CAST STEEL

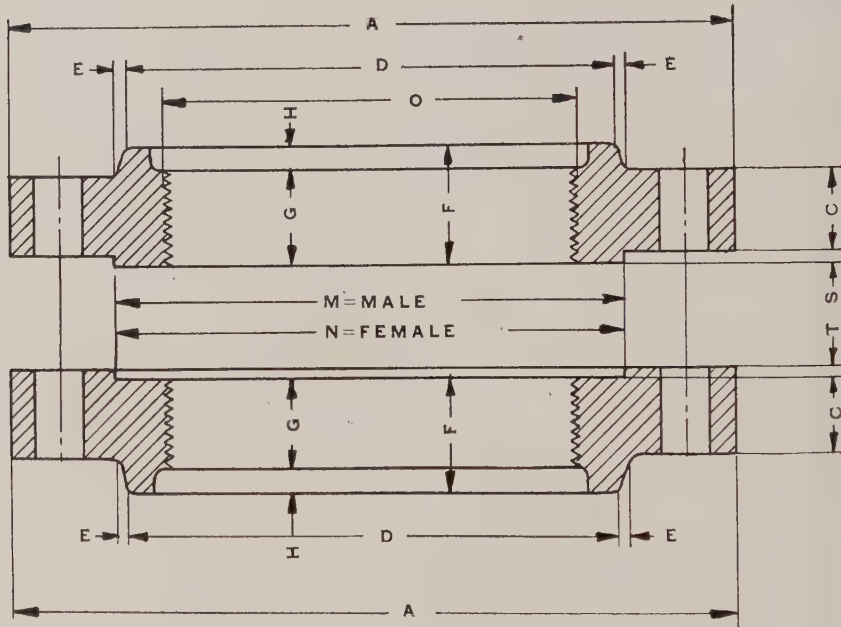


Fig. 4225

Size Inches	A	C	D	E	F	G	H	M=Dia. Male	N=Dia. Female	S	T	No. of Threads	Dia. of Bolts	Length of Bolts	O
1	4 1/8	11/16	2 1/8	1/8	1	11/16	3/16	2 5/16	2 5/8	3/16	1/8	11 1/2	1/2	2 1/4	1 5/16
1 1/4	5	3/4	2 3/8	1/8	1 1/8	3/4	1/2	2 3/4	2 5/8	3/16	1/8	11 1/2	1/2	2 1/4	1 5/16
1 1/2	6	3/4	2 3/4	1/8	1 1/4	3/4	1/2	3 1/8	2 5/8	3/16	1/8	11 1/2	1/2	2 1/4	1 5/16
2	6 1/2	7/8	3 1/8	1/8	1 3/8	3/4	1/2	3 3/8	3 3/8	3/16	1/8	11 1/2	1/2	2 3/4	2 5/8
2 1/2	7 1/2	1	3 3/4	1/8	1 1/2	3/4	1/2	4 1/8	4 1/8	3/16	1/8	8	3/4	2 3/4	2 5/8
3	8 3/4	1 1/8	4 5/8	1/8	1 5/8	1 1/4	1/2	5	5 1/8	3/16	1/8	8	3/4	3 1/4	3 1/2
3 1/2	9	1 3/16	5 1/8	1/8	1 7/8	1 1/4	1/2	5 1/2	5 1/2	3/16	1/8	8	3/4	3 1/2	4
4	10	1 1/4	5 3/8	1/8	1 3/4	1 3/8	1/2	6	6 1/8	3/16	1/8	8	3/4	3 1/2	4 1/2
4 1/2	10 1/2	1 5/8	6 1/8	1/8	1 7/8	1 3/8	1/2	6 1/2	6 1/2	3/16	1/8	8	3/4	3 3/4	5
5	11	1 3/8	6 3/4	1/8	1 7/8	1 3/8	1/2	7 1/4	7 1/4	3/16	1/8	8	3/4	3 3/4	5 1/2
5 1/2	12 1/2	1 7/8	8	1/8	2 1/8	1 7/8	1/2	8 3/8	8 3/8	3/16	1/8	8	3/4	4	6 5/8
6	13	2	8 3/4	1/8	2 1/4	2	1/2	9 1/8	9 1/8	3/16	1/8	8	3/4	4 1/4	7 5/8
7	14 1/2	2 1/8	9 3/4	1/8	2 3/8	2 1/8	1/2	10 3/8	10 3/8	3/16	1/8	8	3/4	4 1/2	8 5/8
8	15 1/2	2 3/8	10 3/4	1/8	2 5/8	2 3/8	1/2	11 3/8	11 3/8	3/16	1/8	8	1	4 3/4	9 5/8
9	16 1/4	2 7/8	11 3/4	1/8	2 7/8	2 5/8	1/2	12 3/8	12 3/8	3/16	1/8	8	1 1/8	5	10 3/4
10	17 1/2	3 1/8	12 3/4	1/8	3 1/8	3 1/8	1/2	13 3/8	13 3/8	3/16	1/8	8	1 1/8	5 1/2	11 3/4
12	20 1/2	3 3/4	14 3/4	1/8	3 3/4	3 3/4	1/2	15 3/8	15 3/8	3/16	1/8	8	1 3/8	5 3/4	14
14	23 1/2	4 1/8	16 3/4	1/8	4 1/8	4 1/8	1/2	16 3/8	16 3/8	3/16	1/8	8	1 3/8	6	15
15	24 1/2	4 3/8	17 3/4	1/8	4 3/8	4 3/8	1/2	17 3/8	17 3/8	3/16	1/8	8	1 3/8	6 1/4	16
16	25 1/2	4 5/8	18 3/4	1/8	4 5/8	4 5/8	1/2	18 3/8	18 3/8	3/16	1/8	8	1 3/8	6 1/4	16
18	28	5 1/8	20 3/4	1/8	5 1/8	5 1/8	1/2	21	21	3/16	1/8	8	1 3/8	6 1/4	18
20	30 1/2	5 3/4	22 3/4	1/8	5 3/4	5 3/4	1/2	23	23	3/16	1/8	8	1 3/8	6 3/4	20

For drilling, see page 461. For description, see page 43.

EXTRA HEAVY SEMI-STEEL AND CAST
STEEL HIGH HUB FLANGES

250 POUNDS WORKING STEAM PRESSURE — SEMI-STEEL
350 POUNDS WORKING STEAM PRESSURE — CAST STEEL

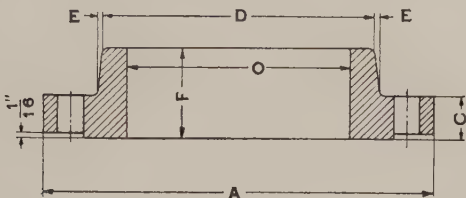


Fig. 4226

I. D. PIPE	Size Inches	A	C	D	E	F	O
	4	10	1 1/4	5 3/4	1/8	3 1/8	4 1/2
	4 1/2	10 1/2	1 1/16	6 1/2	1/8	3 1/4	5
	5	11	1 3/8	7	1/8	3 5/16	5 9/16
	6	12 1/2	1 1/16	8 1/2	1/8	3 3/8	6 5/8
	7	14	1 1/2	9 1/2	1/8	3 3/8	7 5/8
	8	15	1 5/8	10 1/2	3/16	3 1/2	8 5/8
	9	16 1/4	1 3/4	11 1/2	3/16	3 5/8	9 5/8
	10	17 1/2	1 7/8	12 3/4	3/16	3 3/4	10 3/4
	12	20 1/2	2	14 1/8	1/4	4	12 3/4
O. D. PIPE	8	15	1 5/8	9 7/8	3/16	3 1/2	8
	9	16 1/4	1 3/4	10 7/8	3/16	3 5/8	9
	10	17 1/2	1 7/8	12	3/16	3 3/4	10
	12	20 1/2	2	14 1/8	1/4	4	12
	14	23	2 1/8	16 1/4	1/4	4 3/8	14
	15	24 1/2	2 3/16	17 3/8	1/4	4 1/2	15
	16	25 1/2	2 1/4	18 1/2	1/4	4 3/4	16
	18	28	2 3/8	20 5/8	5/16	5	18
	20	30 1/2	2 1/2	22 3/4	5/16	5 3/8	20
	22	33	2 5/8	24 1/8	5/16	5 3/4	22
	24	36	2 3/4	27	3/8	6	24
	26	38 1/4	2 9/16	29 1/2	3/8	6 1/4	26
	28	40 3/4	2 5/16	31 1/4	3/8	6 1/4	28

For drilling, see page 461.

For price list, see page 183.

For description, see pages 44 and 45.

These Flanges are used for the Atwood Lap, as well as the Shrunk and Expanded Joint. When used for this service the cross section is as shown except the bore and raised face.

EXTRA HEAVY SEMI-STEEL AND CAST STEEL HIGH HUB FLANGES

MALE AND FEMALE

250 POUNDS WORKING STEAM PRESSURE — SEMI-STEEL

350 POUNDS WORKING STEAM PRESSURE — CAST STEEL

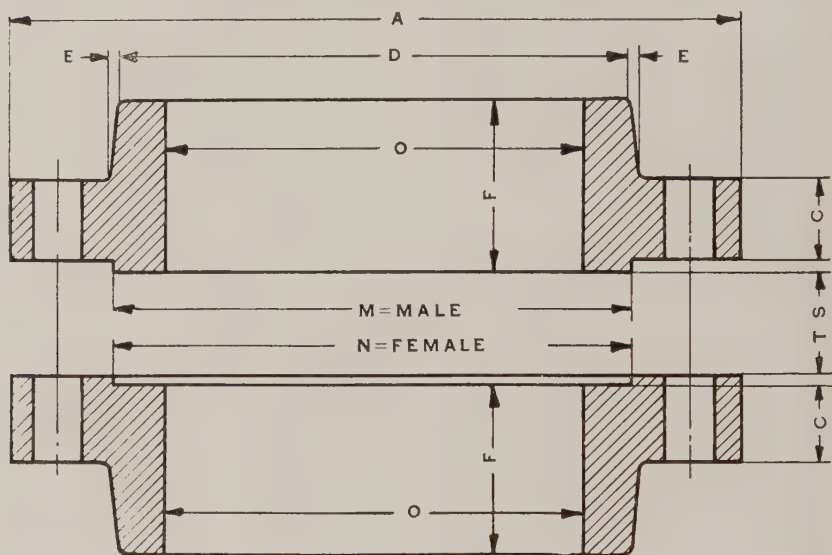


Fig. 4227

I. D. PIPE	Size Ins.	A	C	D	E	F	M=Dia. Male	N=Dia. Female	S	T	Dia. of Bolts	Length of Bolts	O
	8	15	1 $\frac{5}{8}$	10 $\frac{1}{2}$	$\frac{3}{16}$	3 $\frac{1}{2}$	10 $\frac{5}{8}$	10 $\frac{11}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{7}{8}$	4 $\frac{1}{2}$	8 $\frac{5}{8}$
	9	16 $\frac{1}{4}$	1 $\frac{3}{4}$	11 $\frac{1}{2}$	$\frac{3}{16}$	3 $\frac{5}{8}$	11 $\frac{5}{8}$	11 $\frac{11}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1	4 $\frac{3}{4}$	9 $\frac{5}{8}$
	10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	12 $\frac{3}{4}$	$\frac{3}{16}$	3 $\frac{3}{4}$	12 $\frac{3}{4}$	12 $\frac{13}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1	5	10 $\frac{3}{4}$
	12	20 $\frac{1}{2}$	2	14 $\frac{7}{8}$	$\frac{1}{4}$	4	15 $\frac{1}{4}$	15 $\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{8}$	5 $\frac{1}{2}$	12 $\frac{3}{4}$
O. D. PIPE	8	15	1 $\frac{5}{8}$	9 $\frac{7}{8}$	$\frac{3}{16}$	3 $\frac{1}{2}$	10 $\frac{5}{8}$	10 $\frac{11}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{7}{8}$	4 $\frac{1}{2}$	8
	9	16 $\frac{1}{4}$	1 $\frac{3}{4}$	10 $\frac{7}{8}$	$\frac{3}{16}$	3 $\frac{5}{8}$	11 $\frac{5}{8}$	11 $\frac{11}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1	4 $\frac{3}{4}$	9
	10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	12	$\frac{3}{16}$	3 $\frac{3}{4}$	12 $\frac{3}{4}$	12 $\frac{13}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1	5	10
	12	20 $\frac{1}{2}$	2	14 $\frac{1}{8}$	$\frac{1}{4}$	4	15 $\frac{1}{4}$	15 $\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{8}$	5 $\frac{1}{2}$	12
	14	23	2 $\frac{1}{8}$	16 $\frac{1}{4}$	$\frac{1}{4}$	4 $\frac{3}{8}$	16 $\frac{1}{2}$	16 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{8}$	5 $\frac{3}{4}$	14
	15	24 $\frac{1}{2}$	2 $\frac{3}{16}$	17 $\frac{3}{8}$	$\frac{1}{4}$	4 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{4}$	6	15
	16	25 $\frac{1}{2}$	2 $\frac{1}{4}$	18 $\frac{1}{2}$	$\frac{1}{4}$	4 $\frac{3}{4}$	18 $\frac{1}{2}$	18 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{4}$	6	16
	18	28	2 $\frac{3}{8}$	20 $\frac{5}{8}$	$\frac{5}{16}$	5	21	21 $\frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{4}$	6 $\frac{1}{4}$	18
	20	30 $\frac{1}{2}$	2 $\frac{1}{2}$	22 $\frac{3}{4}$	$\frac{5}{16}$	5 $\frac{3}{8}$	23	23 $\frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{3}{8}$	6 $\frac{3}{4}$	20
	22	33	2 $\frac{5}{8}$	24 $\frac{7}{8}$	$\frac{5}{16}$	5 $\frac{3}{4}$	25 $\frac{1}{2}$	25 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{1}{2}$	7	22
	24	36	2 $\frac{3}{4}$	25	$\frac{3}{8}$	6	27 $\frac{1}{2}$	27 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	1 $\frac{5}{8}$	7 $\frac{1}{2}$	24

For drilling, see page 461.

EXTRA HEAVY ROLLED STEEL
SCREWED FLANGES

350 POUNDS WORKING STEAM PRESSURE

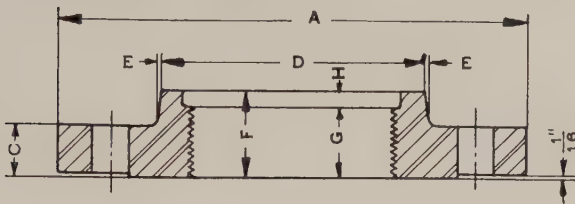


Fig. 4228

Inside Diameter of Pipe														Outside Diameter of Pipe							
Size. in.	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	14	15	16	18	20	22	24	
A	6½	7½	8¼	9	10	10½	11	12½	14	15	16½	17½	20½	23	24½	25½	28	30½	33	36	
C	3½	4½	5½	6½	7½	8½	9½	11½	13½	14½	16½	17½	20½	23	24½	25½	28	30½	33	36	
D	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
E	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
F	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
G	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
H	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
I	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
J	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
K	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
L	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
M	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
N	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
O	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
P	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
Q	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
R	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
S	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
T	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
U	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
V	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
W	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
X	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
Y	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
Z	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AA	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AB	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AC	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AD	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AE	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AF	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AG	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AH	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AI	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AJ	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AK	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AL	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AM	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AN	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AO	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AP	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AQ	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AR	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AS	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AT	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AU	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AV	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AW	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	
AX	1½	2½	3½	4½	5½	6½	7½	9½	11½	12½	14½	15½	18½	21	22½	23½	26	28½	31	34	

EXTRA HEAVY BRONZE UNIONS
250 POUNDS WORKING STEAM PRESSURE

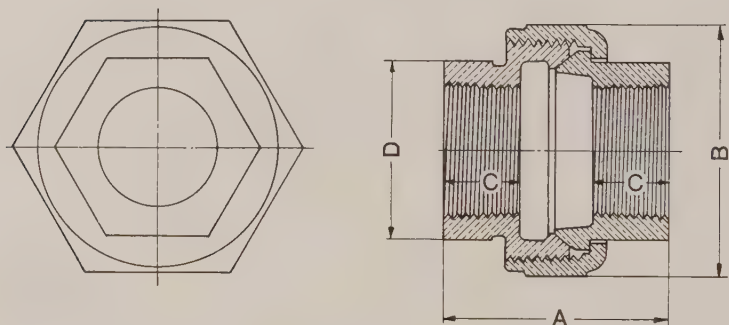


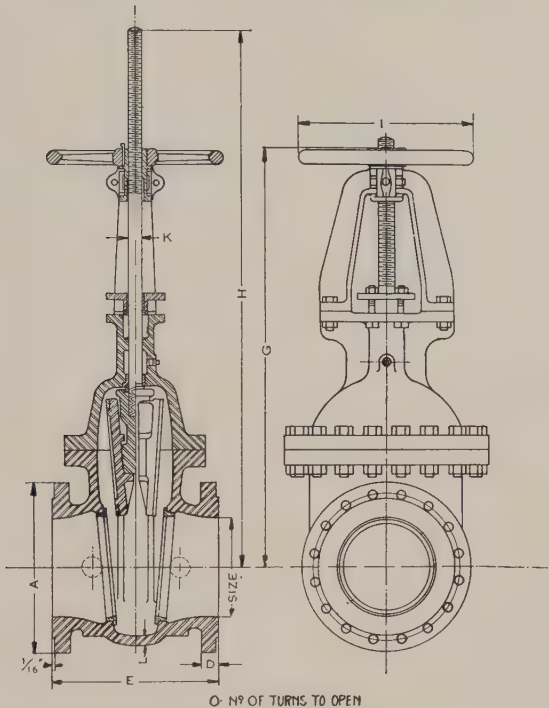
Fig. 4021

Size. . . . in.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
A	$1\frac{35}{64}$	$1\frac{49}{64}$	$2\frac{1}{32}$	$2\frac{5}{32}$	$2\frac{13}{32}$	$2\frac{9}{16}$	$2\frac{7}{8}$	$3\frac{3}{16}$
B	$1\frac{5}{8}$	2	$2\frac{9}{32}$	$2\frac{5}{8}$	$2\frac{15}{16}$	$3\frac{9}{16}$	$4\frac{1}{8}$	$4\frac{3}{4}$
C	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{5}{16}$
D	$1\frac{1}{16}$	$1\frac{3}{8}$	$1\frac{5}{8}$	2	$2\frac{1}{4}$	$2\frac{13}{16}$	$3\frac{5}{16}$	$3\frac{15}{16}$

For price list, see page 180.

EXTRA HEAVY CAST STEEL GATE
VALVES No. 4 S

WITH OR WITHOUT BY-PASS. TAPER SEAT
350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Outside Screw Valve
Fig. 4241

Size. in.	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	10	12	14	16	18
A	6	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	14	15	17 1/2	20 1/2	23	25 1/2	28
D	13 1/8	7 1/8	1	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	1 5/8	1 7/8	2	2 1/8	2 1/4	2 3/8
E	7	8 3/4	9	9 1/2	11	11	11 3/4	13	15	16 1/2	18	19 3/4	21 1/2	21 1/2	24	24
G	15 1/4	18 5/16	20 1/4	20 3/4	22 3/8	25 1/2	26	28 1/4	30 1/4	33	37 3/8	42 3/4	50 1/4	55 3/4	62 5/8	70 5/8
H	17 3/4	21 1/8	24 1/8	25 1/8	27 1/4	30 3/16	31 7/8	35 1/8	37 7/8	42	47	54 1/2	64 1/2	72	81 3/4	91 5/8
I	6	7 1/2	9	9	9	12	12	15	15	15	18	18	21	21	27	32
K	3/4	7/8	1	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	2	2 1/4
L	3/8	7/16	7/16	1/2	1/2	1/2	5/16	5/8	1/2	3/4	7/8	1 1/16	1	1 1/16	1 1/8	1 1/4
O	12	16	13	15	17	19	21	12	14	16	18	22	26	30	35	39

For drilling, see page 461.
For price list, see pages 195 and 196.
For description, see page 191.
For repair parts, see page 558.
These valves are furnished with bosses, which can be tapped for screwed by-passes when so ordered.
For by-pass, see pages 196 and 197.

EXTRA HEAVY CAST STEEL GATE VALVES No. 4 S

BEVEL GEARED. TAPER SEAT

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE

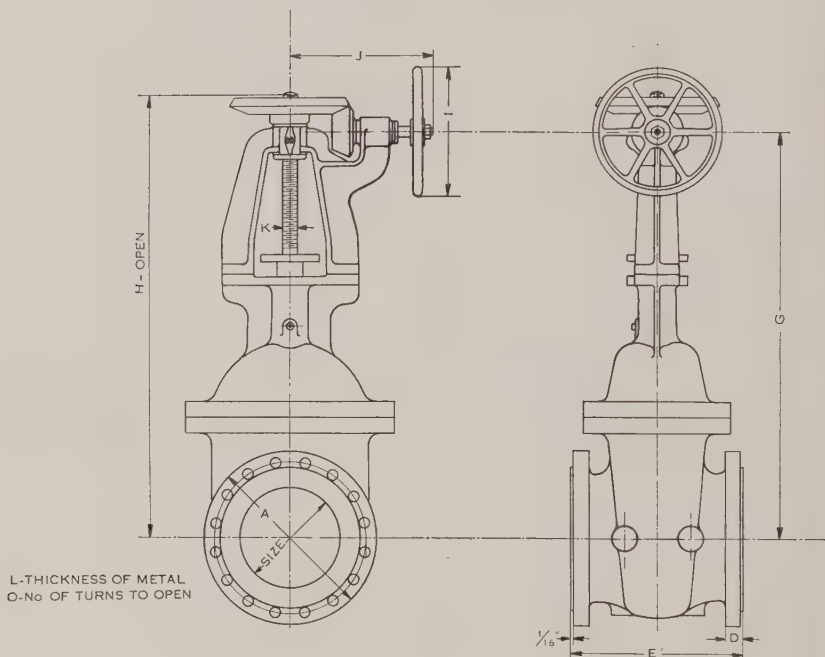


Fig. 4242

Size Inches	A	D	E	G	H	I	J	K	L	O
6	12½	1 7/16	13	28 3/4	37 7/8	15	14 3/4	1 1/4	1/16	28
7	14	1 1/2	15	31 1/2	42	15	14 3/4	1 1/4	3/4	32
8	15	1 5/8	16 1/2	35 7/8	47	15	14 3/4	1 1/2	7/8	36
10	17 1/2	1 7/8	18	41 1/4	54 1/2	15	14 3/4	1 1/2	15/16	44
12	20 1/2	2	19 3/4	47 1/4	64 1/2	18	16 3/4	1 3/4	1	61
14	23	2 1/8	21 1/2	52 3/4	72	18	16 3/4	1 3/4	1 1/16	70
16	25 1/2	2 1/4	21 1/2	59 5/16	81 3/4	21	17	2	1 1/8	82
18	28	2 3/8	24	67 5/16	91 5/8	27	21 1/4	2 1/4	1 1/4	117

For drilling, see page 461.

Prices on application.

These valves are furnished with bosses, which can be tapped for screwed By-passes when so ordered.

For By-pass, see pages 196 and 197.

EXTRA HEAVY CAST STEEL GATE
VALVES No. 4 S

SPUR GEARED. TAPER SEAT

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE

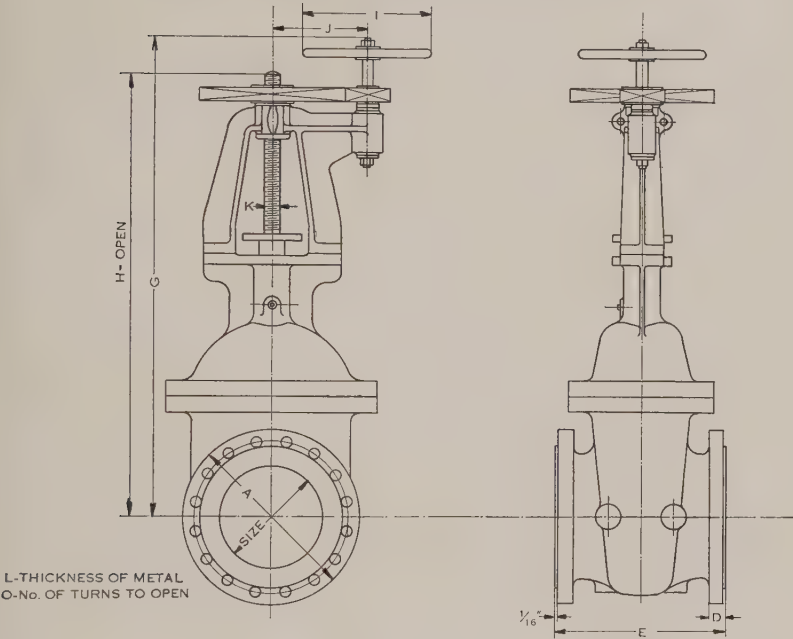


Fig. 4243

Size Inches	A	D	E	G	H	I	J	K	L	O
8	15	1 ⁵ / ₈	16 ¹ / ₂	43 ¹ / ₄	47	15	9	1 ¹ / ₂	7 ⁷ / ₈	36
10	17 ¹ / ₂	1 ⁷ / ₈	18	48 ⁵ / ₈	54 ¹ / ₂	15	9	1 ¹ / ₂	15 ¹⁵ / ₁₆	44
12	20 ¹ / ₂	2	19 ³ / ₄	56 ¹ / ₈	64 ¹ / ₂	18	11	1 ³ / ₄	1	70
14	23	2 ¹ / ₈	21 ¹ / ₂	61 ⁵ / ₈	72	18	11	1 ³ / ₄	1 ¹ / ₁₆	80
16	25 ¹ / ₂	2 ¹ / ₄	21 ¹ / ₂	68 ¹ / ₄	81 ³ / ₄	18	11	2	1 ¹ / ₈	94
18	28	2 ³ / ₈	24	76 ³ / ₈	91 ⁵ / ₈	21	13 ¹ / ₂	2 ¹ / ₄	1 ¹ / ₄	137

For drilling, see page 461.

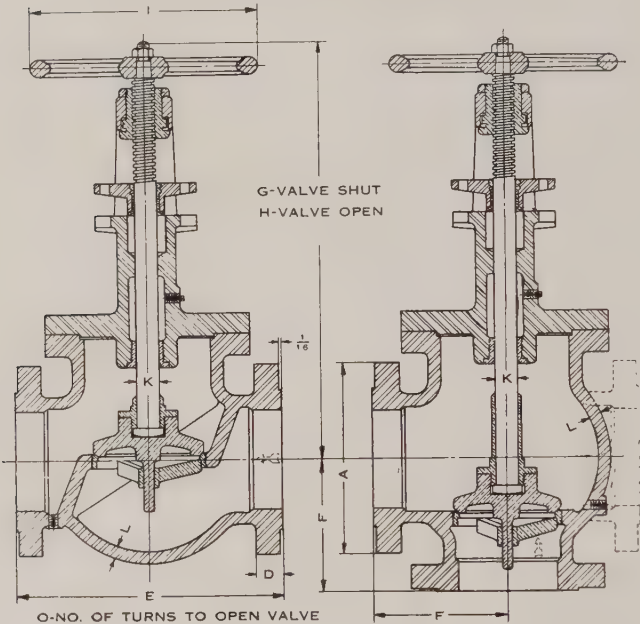
Prices on application.

These valves are furnished with bosses, which can be tapped for screwed By-passes when so ordered.

For By-pass, see pages 196 and 197.

FLANGED GLOBE, ANGLE AND CROSS VALVES

CAST STEEL. MONEL MOUNTED
350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Globe Valve
Fig. 4143

Angle Valve
Cross Valve
Fig. 4158

Size.....inches	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
D	7⅞	1	1⅞	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅞	2⅞	2¼
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½
F	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½	15	16	17¼
G	14⅞	17⅝	20½	23½	25⅞	27⅝	30⅞	32⅞	38⅝	42¾	47⅝	49⅞	50⅞
H	15⅝	18⅜	21⅞	24⅞	27⅜	29⅝	32⅞	35⅞	41⅞	46	51⅜	53⅞	54⅝
I	6	6	7½	9	12	15	15	18	21	27	32	36	36
K	¾	7⅞	1	1⅞	1¼	1½	1½	1¾	2	2¼	2½	2¾	2¾
L	1½	1½	9⅞	5⅞	3¼	5⅞	7⅞	1	1	1⅞	1⅞	1⅞	1¼
O	4⅞	5¼	4	5½	6	6¾	8	9	11	13	15	16	17

Due to the large unbalanced pressure, we recommend the use of a by-pass on these valves for sizes larger than 6 inch.
For drilling, see page 461.
For price list, see page 198.

EXTRA HEAVY SWING CHECK VALVES
CAST STEEL. MONEL MOUNTED
350 POUNDS WORKING PRESSURE

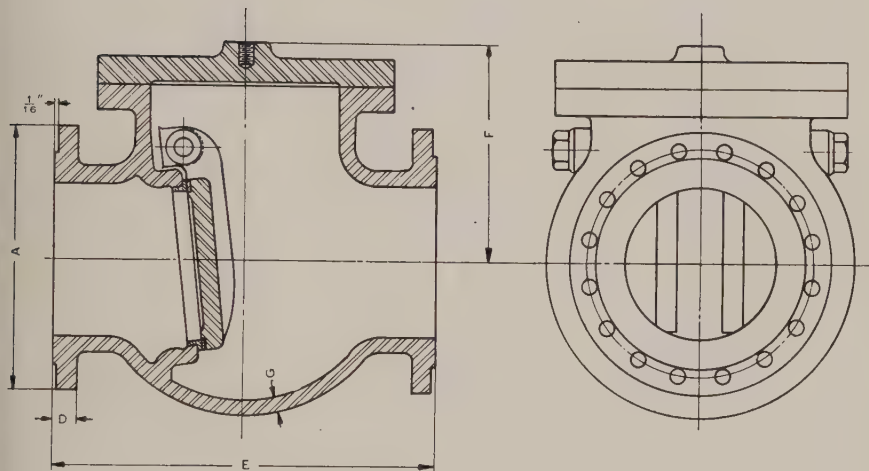


Fig. 4230

Size Inches	2	2½	3	4	5	6	7	8	10	12	14	15	16	18	20	24
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½	28	30½	36
D	⅞	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼	2⅝	2½	2¾
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½	37	43	45
F	5⅞	7	7⅞	8⅞	9⅞	10⅞	11⅞	12⅞	13⅞	16⅞	18	18½	18⅝	20¼	23	24½
G	½	½	⅞	⅝	¾	⅞	⅞	1	1	1⅞	1⅞	1⅞	1¼	1⅞	1½	1⅝

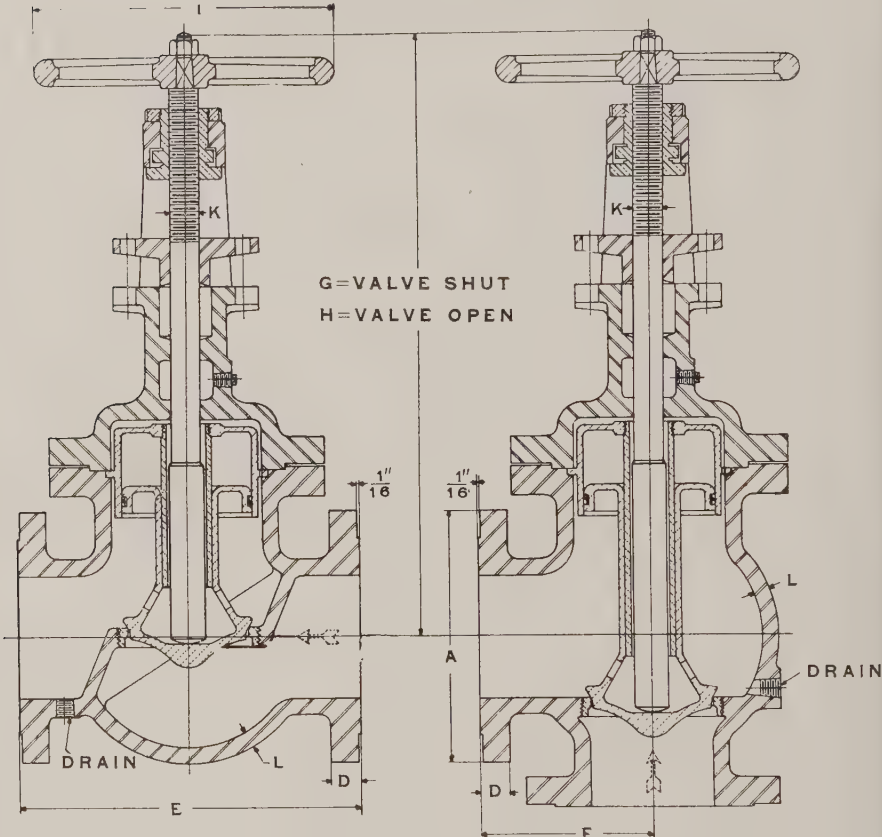
For drilling, see page 461.
For price list, see page 200.

ATWOOD NON-RETURN VALVES

(STOP AND CHECK VALVES)

EXTRA HEAVY. CAST STEEL. MONEL MOUNTED
GLOBE AND ANGLE TYPES

350 POUNDS WORKING STEAM PRESSURE
700 DEGREES TOTAL TEMPERATURE



Globe Non-Return Valve
Fig. 4231

Angle Non-Return Valve
Fig. 4232

"O" = Number of turns to open valve.

Size..... Inches	4	5	6	7	8	10
A	10	11	12 1/2	14	15	17 1/2
D	1 1/4	1 3/8	1 7/16	1 1/2	1 5/8	1 7/8
E	13	14 1/2	17	20	21	25
F	6 1/2	7 1/4	8 1/2	10	10 1/2	12 1/2
G	23	25 3/4	29 13/16	31	34	38 3/4
H	24 3/4	27 3/4	32 1/16	33 1/2	36 3/4	42
I	9	12	15	15	18	21
K	1 1/8	1 1/4	1 1/2	1 1/2	1 3/4	2
L	5/8	3/4	13/16	7/8	1	1
O	7	8	9	10	11	13
Drain	3/4	3/4	3/4	1	1	1

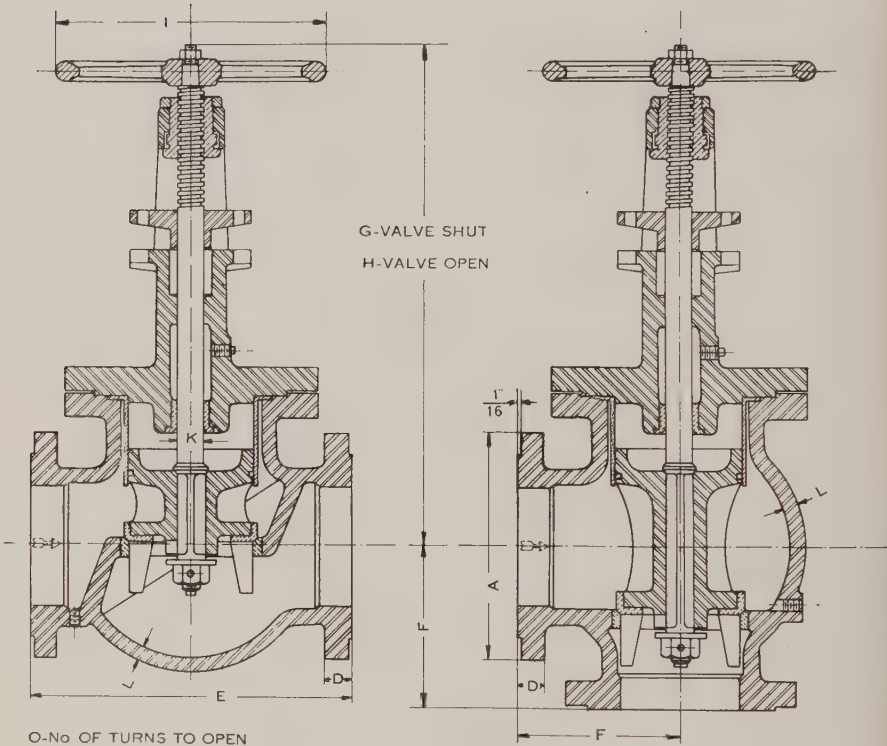
For drilling, see page 461. For description, see page 139. For price list, see page 203.

FLANGED ANGLE AND GLOBE
BALANCED THROTTLE VALVES

CAST STEEL. MONEL MOUNTED.

350 POUNDS WORKING STEAM PRESSURE

700 DEGREES TOTAL TEMPERATURE



O-No OF TURNS TO OPEN

Globe Throttle Valve
Fig. 4244

Angle Throttle Valve
Fig. 4245

Size	2	2½	3	4	5	6	7	8	10	12	14	15	16
A	6½	7½	8¼	10	11	12½	14	15	17½	20½	23	24½	25½
D	7¼	1	1⅛	1¼	1½	1¾	1⅞	2	2¼	2½	2¾	2⅞	3
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½
F	4½	5¼	5½	6½	7¼	8½	10	10½	12½	13½	15	16	17¼
G	14½	17	20	23½	25½	27½	30	32½	38½	42¾	47½	49¾	50¾
H	15½	18½	21½	24½	27½	29½	32½	35	41½	46	51½	53½	54½
I	6	6	7½	9	12	15	15	13	21	27	32	36	36
K	¾	7⁄8	1	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	2⅞	3
L	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
O	4½	5¼	4	5½	6	6¾	8	9	11	13	15	16	17

For drilling, see page 461.

For price list, see page 199.

TEMPLATES FOR DRILLING

MEDIUM AND EXTRA HEAVY FLANGED VALVES AND EXTRA HEAVY FLANGED FITTINGS

AMERICAN STANDARD FOR 250 POUNDS

Effective January 1, 1914

Size Inches	Diameter of Flange	Thickness of Flange	Bolt Circle	Number of Bolts	Size of Bolts	Length of Bolts	Length of Studs with 2 Nuts
1	4½	⅞	3¼	4	½	2¼	....
1¼	5	¾	3¾	4	½	2¼	....
1½	6	¾	4½	4	⅝	2½	....
2	6½	⅞	5	4	⅝	2¾	....
2½	7½	1	5⅞	4	¾	3	....
3	8¼	1⅛	6⅞	8	¾	3¼	....
3½	9	1⅜	7¼	8	¾	3½	....
4	10	1½	7⅞	8	¾	3½	....
4½	10½	1⅝	8½	8	¾	3¾	....
5	11	1⅝	9¼	8	¾	3¾	....
6	12½	1⅞	10⅞	12	¾	4	....
7	14	1½	11⅞	12	⅞	4¼	....
8	15	1⅝	13	12	⅞	4½	....
9	16¼	1¾	14	12	1	4¾	....
10	17½	1⅞	15¼	16	1	5	....
12	20½	2	17¾	16	1⅛	5½	....
14	23	2⅛	20¼	20	1⅛	5¾	....
15	24½	2⅝	21½	20	1¼	6	....
16	25½	2¼	22½	20	1¼	6	....
18	28	2⅝	24¾	24	1¼	6¼	....
20	30½	2½	27	24	1⅝	6¾	....
22	33	2⅝	29¼	24	1½	7	....
24	36	2¾	32	24	1⅝	7½	9¼
26	38¼	2⅞	34½	28	1⅝	7½	9½
28	40¾	2⅞	37	28	1⅝	7¾	9¾
30	43	3	39¼	28	1¾	8	10
32	45¼	3⅛	41½	28	1⅞	8½	10½
34	47½	3¼	43½	28	1⅞	8¾	10¾
36	50	3⅝	46	32	1⅞	9	11
38	52¼	3⅞	48	32	1⅞	9¼	11¼
40	54½	3⅞	50¼	36	1⅞	9½	11½
42	57	3⅞	52¾	36	1⅞	9¾	11¾
44	59¼	3¾	55	36	2	10	12
46	61½	3⅞	57¼	40	2	10¼	12¼
48	65	4	60¾	40	2	10½	12½

Number of holes are in multiples of four, so that fittings may be made to face to any quarter. Bolt holes straddle the center lines.

Bolt holes are drilled ⅛ inch larger than nominal diameter of bolts, except for bolts 1¾ inch diameter and larger, when holes are drilled ¼ inch larger than diameter of bolt.

AMERICAN EXTRA HEAVY DRILLING with commercial bolts is inadequate for more than 300 pounds steam working pressure. Above this pressure STEEL BOLTS OF HIGH TENSILE STRENGTH or commercial bolts larger in diameter should be used on the end flanges.

STANDARD HYDRAULIC SEMI-STEEL
BODY CRITCHLOW VALVES

500 POUNDS WORKING PRESSURE

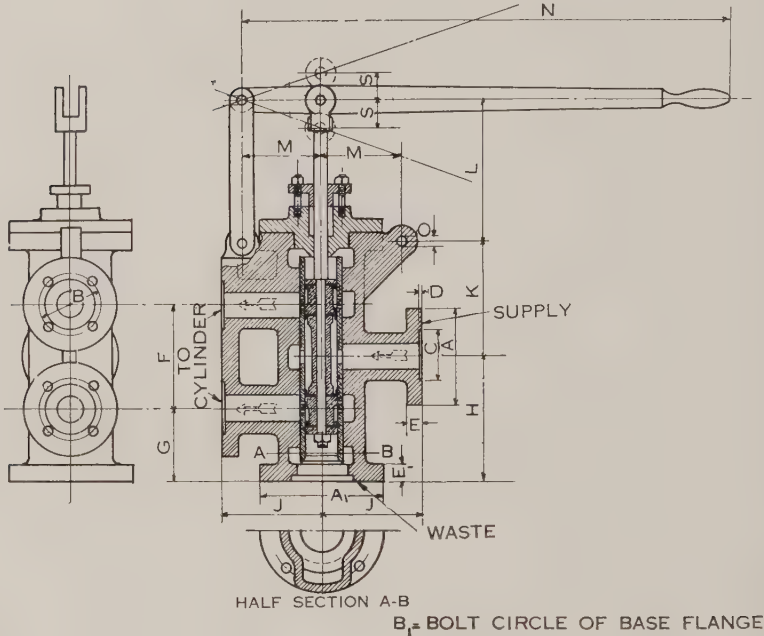


Fig. 5026

Size of Valve Inches	Pressure Flanges						Base Flanges													
	Diameter of Flange	Bolt Circle	Diameter of Female	Depth of Female		Number of Holes	Diameter of Flange	Bolt Circle		Number of Holes	Diameter of Flange									
	A	B	C	D	E		A ₁	B ₁	E ₁			F	G	H	J	K	L	M	N	S
1	5	3 ⁷ / ₈	2 ³ / ₁₆	1 ¹ / ₈	1 ¹ / ₈	4	6 ¹ / ₂	5 ¹ / ₄	3 ⁷ / ₈	4	3 ⁷ / ₈	5 ¹ / ₂	4 ¹ / ₄	7	4 ⁷ / ₈	6 ¹ / ₈	6 ¹ / ₄	3	21 ¹ / ₈	1 ⁵ / ₁₆
1 ¹ / ₄	6 ¹ / ₈	4 ¹ / ₂	3 ¹ / ₁₆	1 ¹ / ₈	1 ¹ / ₈	4	7 ¹ / ₂	5 ³ / ₄	1 ¹ / ₈	4	4 ¹ / ₄	6 ¹ / ₈	5 ¹ / ₄	8 ³ / ₁₆	5 ¹ / ₄	7 ¹ / ₁₆	7 ¹ / ₈	3 ⁵ / ₈	28 ¹ / ₂	1 ⁹ / ₁₆
1 ¹ / ₂	6 ¹ / ₈	4 ¹ / ₂	3 ¹ / ₁₆	1 ¹ / ₈	1 ¹ / ₈	4	7 ¹ / ₂	5 ³ / ₄	1 ¹ / ₈	4	4 ¹ / ₄	6 ¹ / ₈	5 ¹ / ₄	8 ³ / ₁₆	5 ¹ / ₄	7 ¹ / ₁₆	7 ¹ / ₈	3 ⁵ / ₈	29 ⁷ / ₈	1 ⁹ / ₁₆
2	7 ¹ / ₄	5 ¹ / ₂	4 ¹ / ₁₆	1 ³ / ₈	1 ³ / ₈	4	9 ³ / ₈	7 ⁵ / ₈	1 ¹ / ₂	4	4 ¹ / ₄	8 ³ / ₈	5 ¹ / ₂	9 ¹ / ₂	7 ¹ / ₂	8 ³ / ₄	10 ³ / ₁₆	6	37	1 ¹ / ₈
2 ¹ / ₄	7 ¹ / ₄	5 ³ / ₄	4 ⁹ / ₁₆	1 ³ / ₈	1 ³ / ₈	4	10 ³ / ₈	8 ⁵ / ₈	1 ¹ / ₂	4	4 ¹ / ₄	9	6	10 ¹ / ₂	8 ¹ / ₄	9 ³ / ₄	12 ³ / ₄	7	44	2 ¹ / ₂
3	8 ¹ / ₂	6 ³ / ₄	5 ⁹ / ₁₆	1 ³ / ₈	1 ³ / ₈	6	11 ³ / ₈	9 ⁵ / ₈	1 ¹ / ₂	4	4 ¹ / ₄	10 ¹ / ₄	6 ³ / ₈	11 ¹ / ₂	9 ¹ / ₄	10 ³ / ₄	12 ³ / ₈	7 ¹ / ₄	40 ¹¹ / ₁₆	2 ⁹ / ₈
4	9 ¹ / ₂	7 ³ / ₄	6 ⁵ / ₁₆	1 ³ / ₈	1 ³ / ₈	6	14	12	1 ⁵ / ₈	4	4 ¹ / ₄	10 ¹ / ₄	7 ³ / ₄	12 ⁷ / ₈	8	11 ³ / ₄	15	8 ¹ / ₂	49	3 ¹ / ₄

Omitting the lower branch converts the valve, which is four-way in the plate, into a three-way valve.
For description, see page 239.
For price list, see page 239.

HYDRAULIC CRITCHLOW VALVES

SEMI-STEEL BODY. BRONZE BUSHED. SCREWED
500 POUNDS WORKING PRESSURE

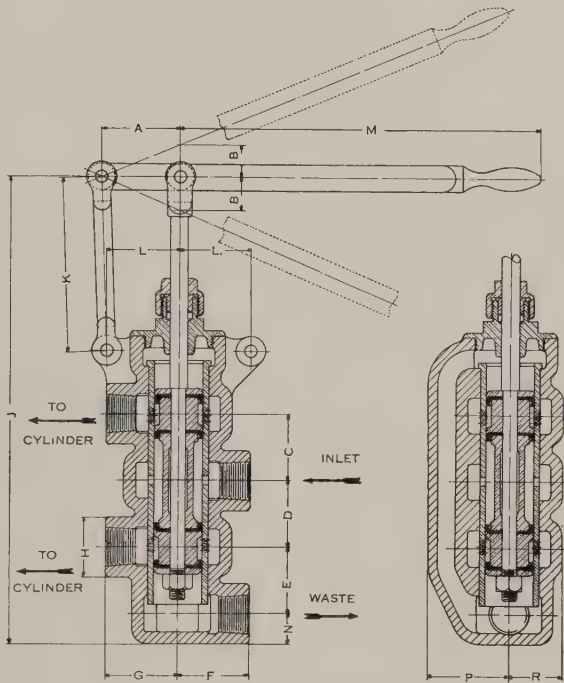


Fig. 5021

Size Inches	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R
$\frac{3}{4}$	$2\frac{1}{2}$	$\frac{29}{32}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$1\frac{7}{8}$	$14\frac{3}{16}$	$6\frac{1}{4}$	$2\frac{1}{4}$	$12\frac{1}{4}$	$\frac{15}{16}$	$2\frac{7}{16}$	$1\frac{5}{8}$
1	$2\frac{1}{2}$	$\frac{29}{32}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$14\frac{3}{8}$	$6\frac{1}{4}$	$2\frac{1}{4}$	$12\frac{1}{4}$	$1\frac{1}{8}$	$2\frac{7}{16}$	$1\frac{5}{8}$
$1\frac{1}{4}$	$3\frac{1}{4}$	$1\frac{3}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	3	3	$2\frac{1}{2}$	$19\frac{3}{8}$	$7\frac{1}{4}$	3	15	$1\frac{1}{4}$	$3\frac{3}{8}$	$2\frac{1}{4}$

Plugging one of these openings converts the valve, which is four-way in the cut, into a three-way valve.

For price list, see page 240.

SPECIAL HYDRAULIC CRITCHLOW VALVES

SCREWED CONNECTIONS
BRONZE BODY. BRONZE BUSHED
FOR OPERATING CENTERING GEAR DEVICES
ON REVERSING ENGINES AND THE LIKE
500 POUNDS WORKING PRESSURE

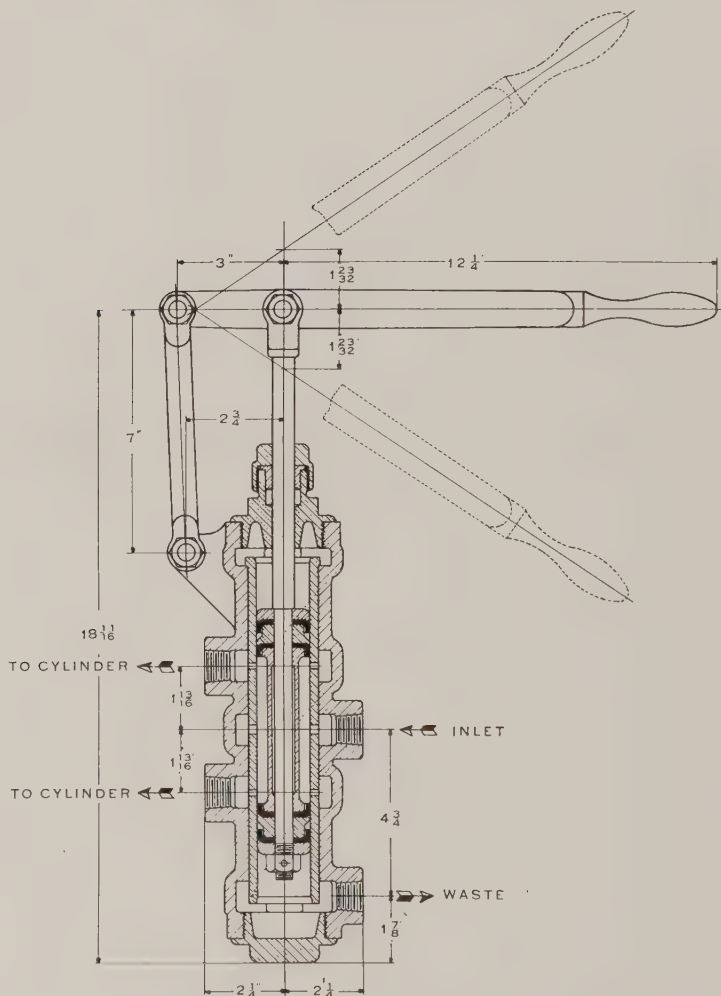


Fig. 5020

For outside view, see page 241.

These valves are designed to supply pressure to both sides of a hydraulic piston when the lever is in its central position, and to exhaust one side or the other by a movement of the lever.

SINGLE HYDRAULIC BRONZE
CRITCHLOW NEST
WITH CAST IRON STAND

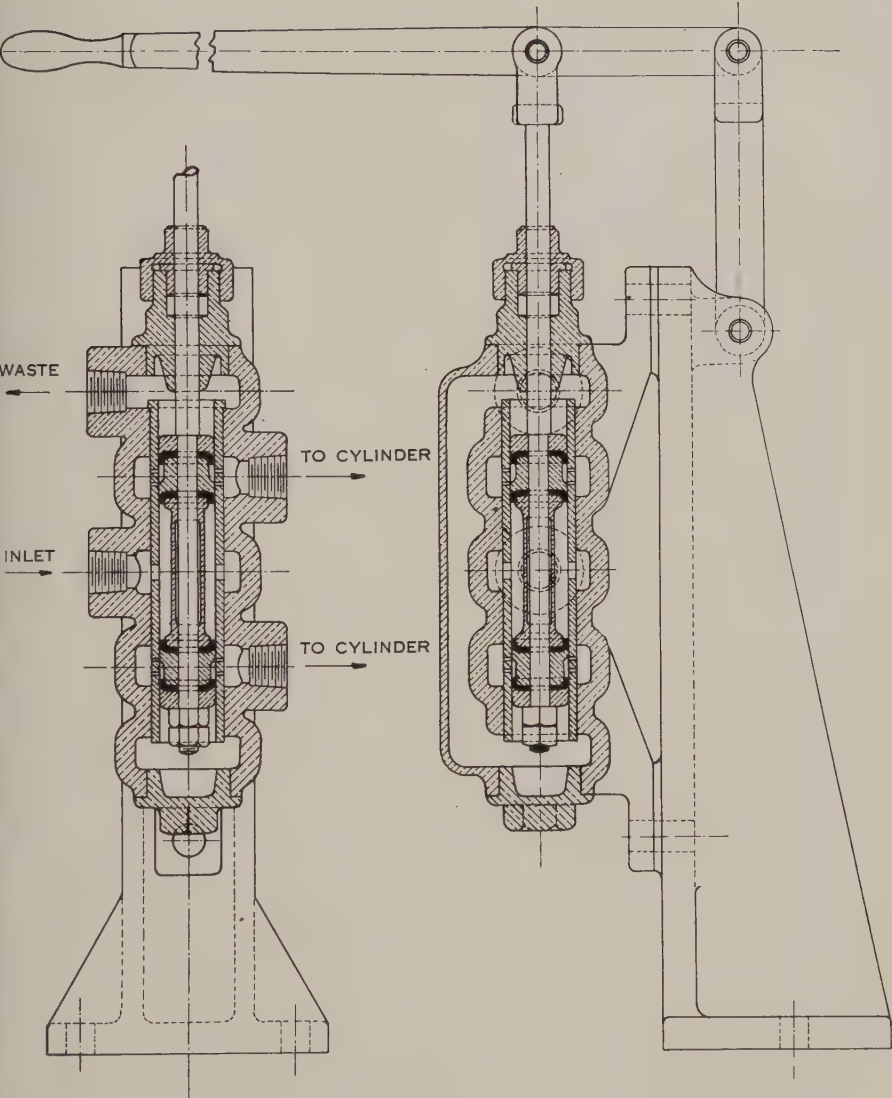


Fig. 5015

SINGLE NEST CRITCHLOW VALVES
WITH END STANDS AND
DRIP PAN

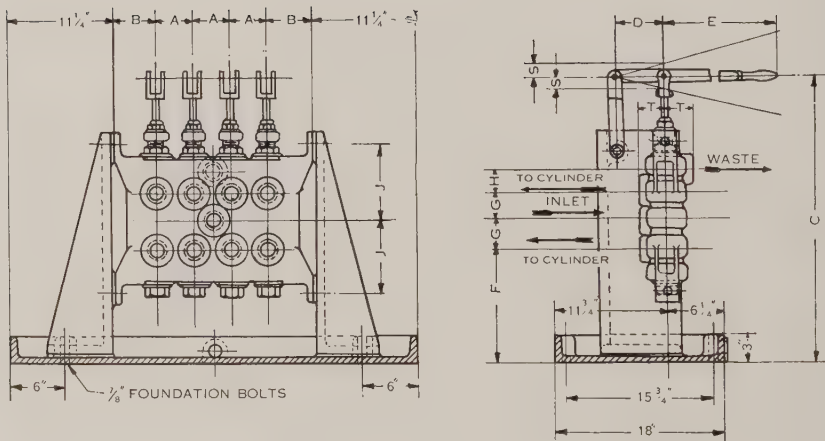


Fig. 5016

Size Inches	A	B	C	D	E	F	G	H	J	S	T
3/4	3 1/2	4 3/8	30 5/8	5	22	13 9/16	2 3/4	2 3/16	7 3/4	1 3/8	2 9/16
1	3 3/4	4 1/2	31 5/8	5	22	12 7/8	2 7/8	2 5/8	8 1/4	1 3/8	3
1 1/4	4	4 3/4	31	5	22	13	3	2 1/8	8	1 1/2	3

For description, see page 246.

Unless otherwise specified valves will be furnished with screwed ends, see page 463.

TWO-NEST GROUPS OF CRITCHLOW
VALVES WITH END STANDS
AND DRIP PAN

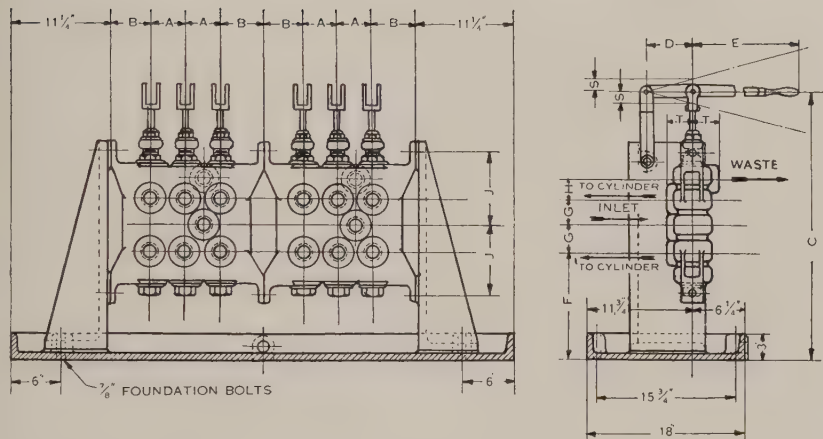


Fig. 5017

Size Inches	A	B	C	D	E	F	G	H	J	S	T
3/4	3 1/2	4 3/8	30 5/8	5	22	13 9/16	2 3/4	2 3/16	7 3/4	1 3/8	2 9/16
1	3 3/4	4 1/2	31 5/8	5	22	12 7/8	2 7/8	2 5/8	8 1/4	1 3/8	3
1 1/4	4	4 3/4	31	5	22	13	3	2 1/8	8	1 1/2	3

For description, see page 246.

Unless otherwise specified, valves will be furnished with screwed ends, see page 463.

TWO-NEST GROUPS OF CRITCHLOW VALVES WITH END STANDS CENTER SUPPORT AND DRIP PAN

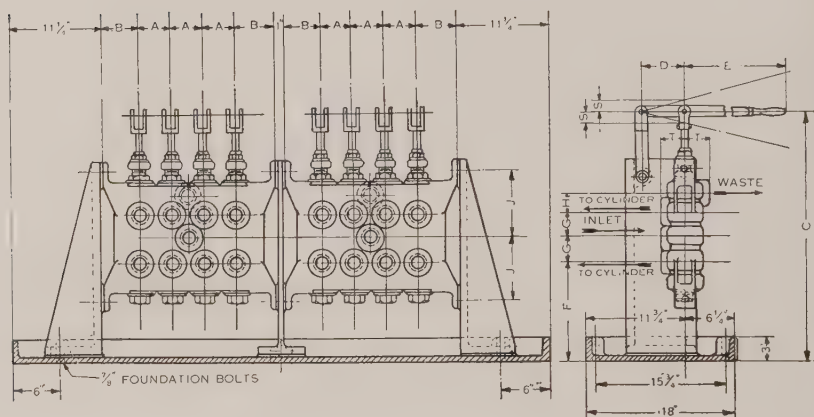


Fig. 5018

Size Inches	A	B	C	D	E	F	G	H	J	S	T
$\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{3}{8}$	$30\frac{5}{8}$	5	22	$13\frac{9}{16}$	$2\frac{3}{4}$	$2\frac{3}{16}$	$7\frac{3}{4}$	$1\frac{3}{8}$	$2\frac{9}{16}$
1	$3\frac{3}{4}$	$4\frac{1}{2}$	$31\frac{5}{8}$	5	22	$12\frac{7}{8}$	$2\frac{7}{8}$	$2\frac{5}{8}$	$8\frac{1}{4}$	$1\frac{3}{8}$	3
$1\frac{1}{4}$	4	$4\frac{3}{4}$	31	5	22	13	3	$2\frac{1}{8}$	8	$1\frac{1}{2}$	3

For description, see page 246.

Unless otherwise specified, valves will be furnished with screwed ends, see page 463.

HYDRAULIC FLANGED GATE VALVES
No. 5P

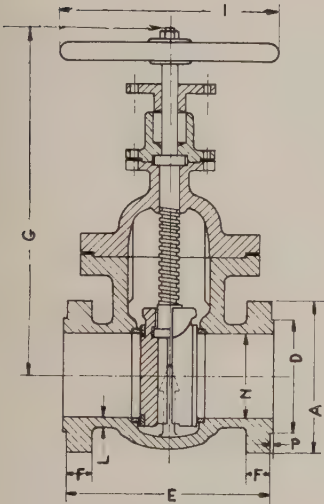
SEMI-STEEL. BRONZE MOUNTED—PARALLEL SEATS

800 POUNDS HYDRAULIC AMERICAN STANDARD

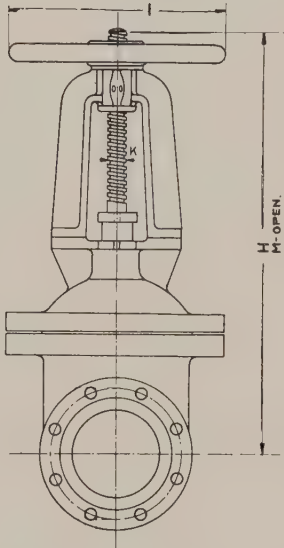
800 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)

500 Pounds Cold Water Working Pressure—Shock

800 Pounds Air or Gas Working Pressure—Temperature not Exceeding
100 deg. Fahr.



Inside Screw Valve
Fig. 5008



Outside Screw and Yoke Valve
Fig. 5009

O=Number of turns to open

Size Inches	G	H	M	A	No. Holes	D	E	F	N	L	I	K	O	P
2	15 ⁵ / ₈	16 ⁷ / ₁₆	18 ⁷ / ₈	6 ³ / ₄	8	3 ⁵ / ₈	10 ¹ / ₂	1 ¹ / ₄	2	3 ⁴ / ₁₆	7 ¹ / ₂	7 ⁸ / ₈	14 ¹ / ₄	3 ¹ / ₁₆
2 ¹ / ₂	16 ⁷ / ₈	17 ¹ / ₂	20 ¹ / ₄	7 ¹ / ₂	8	4 ¹ / ₈	11 ¹ / ₂	1 ³ / ₈	2 ¹ / ₂	13 ¹³ / ₁₆	9	1	11 ¹ / ₄	3 ¹ / ₁₆
3	21 ¹ / ₈	21 ⁵ / ₈	25	8 ¹ / ₂	8	5	12 ¹ / ₂	1 ¹ / ₂	3	7 ⁸ / ₈	12	1 ¹ / ₈	13	3 ¹ / ₁₆
4	22 ³ / ₄	23 ⁷ / ₈	28 ¹ / ₈	10 ³ / ₄	8	6 ³ / ₁₆	15 ¹ / ₂	1 ⁷ / ₈	4	1	15	1 ¹ / ₄	17	3 ¹ / ₁₆
5	25 ³ / ₄	29 ¹ / ₄	34 ³ / ₄	13	8	7 ⁵ / ₁₆	18	2 ¹ / ₈	5	1 ¹ / ₈	18	1 ¹ / ₂	11	3 ¹ / ₁₆
6	27 ¹ / ₄	31	37 ¹ / ₂	14	12	8 ¹ / ₂	18 ¹ / ₂	2 ¹ / ₄	6	1 ³ / ₁₆	18	1 ¹ / ₂	13	3 ¹ / ₁₆
8	32 ¹ / ₄	40 ¹ / ₈	48 ⁷ / ₈	16 ¹ / ₂	12	10 ⁵ / ₈	23 ¹ / ₂	2 ¹ / ₂	8	1 ¹ / ₄	21	1 ³ / ₄	16 ¹ / ₂	1 ¹ / ₄
10	42	50	61 ¹ / ₄	20	16	12 ³ / ₄	28 ¹ / ₂	2 ⁷ / ₈	10	1 ¹ / ₂	32	2 ¹ / ₄	23	1 ¹ / ₄
12	46	59 ¹ / ₄	72 ¹ / ₄	22	20	15	33 ¹ / ₂	3	12	1 ³ / ₄	36	2 ¹ / ₂	26	1 ¹ / ₄

The bore of these valves is made to suit nominal size of standard weight pipe.

For drilling, see page 473.

For price list, see page 253.

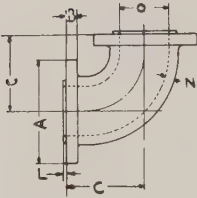
For description, see page 251.

These valves are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face, if so ordered.

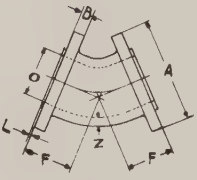
Dimensions of these Special Facings on application.

HYDRAULIC FLANGED FITTINGS
800 POUNDS HYDRAULIC AMERICAN STANDARD
SEMI-STEEL AND CAST STEEL

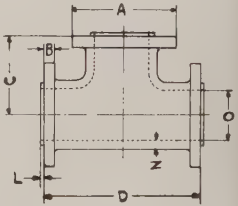
800 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)
500 Pounds Cold Water Working Pressure—Shock
800 Pounds Air or Gas Working Pressure—Temperature Not Exceeding
100 deg. Fahr.



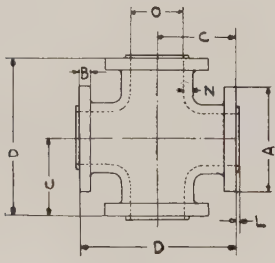
Std. Elbow
Fig. 5010



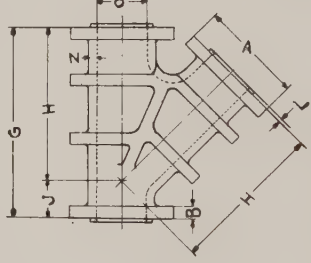
45° Elbow
Fig. 5011



Tee
Fig. 5022



Cross
Fig. 5023



Lateral
Fig. 5024

Size Inches	A	B Semi- Steel	B Cast Steel	C	D	F	G	H	J	N Semi- Steel	N Cast Steel	O	L
1/2	3 1/2	9/16	...	3	6	1 3/4	6 3/4	5 1/4	1 1/2	7/16	...	1/2	3/8
3/4	4	5/8	...	3 1/2	7	2	7 1/2	5 3/4	1 3/4	7/16	...	3/4	3/8
1	4 1/2	11/16	...	4	8	2	8 1/2	6 1/2	2	1/2	...	1	3/8
1 1/4	5	3/4	...	4 1/4	8 1/2	2 1/2	9 1/2	7 1/4	2 1/4	1/2	...	1 1/4	3/8
1 1/2	6	15/16	...	4 1/2	9	2 3/4	11	8 1/2	2 1/2	1/2	...	1 1/2	3/8
2	6 3/4	1 1/4	1	5 1/2	11	4	14	10 3/4	3 1/4	9/16	1 1/2	2	3/8
2 1/2	7 1/2	1 3/8	1 1/8	6 1/4	12 1/2	4 1/4	15 1/2	12 1/4	3 1/4	5/8	2	2 1/2	3/8
3	8 1/2	1 1/2	1 1/4	6 3/4	13 1/2	4 3/4	17	13 1/4	3 3/4	5/8	2 1/2	3	3/8
3 1/2	9 1/2	1 5/8	1 3/8	7 1/4	14 1/2	5 1/4	18 1/2	14 1/4	4 1/4	3/4	3 1/2	4	3/8
4	10 3/4	1 7/8	1 1/2	8 1/4	16 1/2	5 3/4	20 1/2	16 1/4	4 1/4	7/8	4	4 1/2	3/8
4 1/2	11 1/2	2	1 5/8	8 3/4	17 1/2	6 1/4	22 1/2	17 1/4	5 1/4	1	5	5	3/8
5	13	2 1/8	1 3/4	9 3/4	19 1/2	6 3/4	25	19 1/4	5 3/4	1 1/8	6	6	3/8
6	14	2 1/4	1 7/8	10 3/4	21 1/2	7 1/4	27	20 3/4	6 1/4	1 1/8	7	7	3/8
7	15	2 3/8	2	11 3/4	23 1/2	7 3/4	28 1/2	22 1/4	6 1/4	1 1/4	8	8	3/8
8	16 1/2	2 1/2	2 1/4	12 3/4	25 1/2	8 1/4	31	24 1/4	6 3/4	1 3/8	9	9	3/8
9	18	2 3/4	2 1/2	14 1/4	28 1/2	8 3/4	34 1/2	27 1/4	7 1/4	1 1/2	10	10	3/8
10	20 1/2	2 7/8	2 3/2	15 1/4	30 1/2	9 1/4	37	29 1/4	7 3/4	1 5/8	11	11	3/8
12	22	3	2 5/8	16 3/4	32 1/2	9 3/4	39 1/2	31 1/4	8 3/4	1 3/4	12	12	3/8

The bore of these fittings is made to suit nominal size of standard weight pipe.
For drilling dimensions, see page 473.
For price list, see page 254.
These fittings are regularly furnished with a raised face, but can be furnished with Male and Female
or Tongue and Grooved faces, if so ordered.
Dimensions of these Special Facings on application.

HYDRAULIC SEMI-STEEL SCREWED
ELBOWS, TEES AND 45 DEGREE
ELBOWS

800 POUNDS WORKING PRESSURE—NO SHOCK
500 POUNDS WORKING PRESSURE—SHOCK

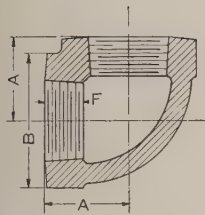


Fig. 555
90° Elbow

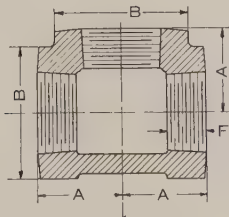


Fig. 556
Tee

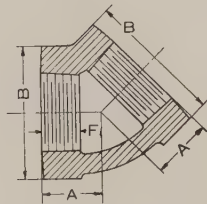


Fig. 557
45° Elbow

Size Inches	A	B	F	Size Inches	A	B	F	Size Inches	A	B	F
1/4	7/8	1 5/16	1/2	1/4	7/8	1 5/16	1/2	1/4	3/4	1 5/16	1/2
3/8	1	1 9/16	9/16	3/8	1	1 9/16	9/16	3/8	13/16	1 9/16	9/16
1/2	1 1/4	1 13/16	11/16	1/2	1 1/4	1 13/16	11/16	1/2	1	1 13/16	11/16
3/4	1 1/2	2 1/8	3/4	3/4	1 1/2	2 1/8	3/4	3/4	1 1/8	2 1/8	3/4
1	1 3/4	2 9/16	7/8	1	1 3/4	2 9/16	7/8	1	1 5/16	2 9/16	7/8
1 1/4	2	3 1/16	1	1 1/4	2	3 1/16	1	1 1/4	1 1/2	3 1/16	1
1 1/2	2 3/16	3 7/16	1 1/8	1 1/2	2 3/16	3 7/16	1 1/8	1 1/2	1 5/8	3 7/16	1 1/8
2	2 1/2	4 1/8	1 1/4	2	2 1/2	4 1/8	1 1/4	2	1 7/8	4 1/8	1 1/4
2 1/2	2 15/16	4 11/16	1 3/8	2 1/2	2 15/16	4 11/16	1 3/8	2 1/2	2 1/8	4 11/16	1 3/8
3	3 9/16	5 5/8	1 1/2	3	3 9/16	5 5/8	1 1/2	3	2 7/16	5 5/8	1 1/2
3 1/2	3 7/8	6 5/16	1 1/2	3 1/2	3 7/8	6 5/16	1 1/2	3 1/2	2 9/16	6 5/16	1 1/2
4	4 1/4	7 1/8	1 5/8	4	4 1/4	7 1/8	1 5/8	4	2 7/8	7 1/8	1 5/8

For price list, see page 255.

HYDRAULIC BRONZE SCREWED ELBOWS, TEES AND 45 DEGREE ELBOWS

800 POUNDS WORKING PRESSURE—NO SHOCK

500 POUNDS WORKING PRESSURE—SHOCK

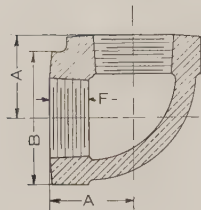


Fig. 552
90° Elbow

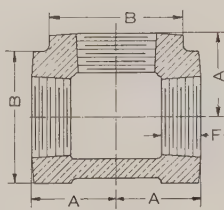


Fig. 553
Tee

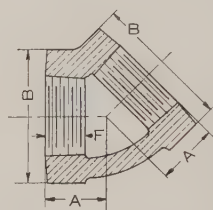


Fig. 554
45° Elbow

Size Inches	A	B	F	Size Inches	A	B	F	Size Inches	A	B	F
1/4	7/8	1	1/2	1/4	7/8	1	1/2	1/4	3/4	1	1/2
3/8	1	1 1/8	9/16	3/8	1	1 1/8	9/16	3/8	13/16	1 1/8	9/16
1/2	1 1/4	1 7/16	11/16	1/2	1 1/4	1 7/16	11/16	1/2	1	1 7/16	11/16
3/4	1 1/2	1 3/4	3/4	3/4	1 1/2	1 3/4	3/4	3/4	1 1/8	1 3/4	3/4
1	1 3/4	2 1/16	7/8	1	1 3/4	2 1/16	7/8	1	1 5/16	2 1/16	7/8
1 1/4	2	2 7/16	1	1 1/4	2	2 7/16	1	1 1/4	1 1/2	2 7/16	1
1 1/2	2 3/16	2 3/4	1 1/8	1 1/2	2 3/16	2 3/4	1 1/8	1 1/2	1 5/8	2 3/4	1 1/8
2	2 1/2	3 11/32	1 1/4	2	2 1/2	3 11/32	1 1/4	2	1 7/8	3 11/32	1 1/4
2 1/2	2 5/16	4 1/16	1 3/8	2 1/2	2 5/16	4 1/16	1 3/8	2 1/2	2 1/8	4 1/16	1 3/8
3	3 9/16	4 3/4	1 1/2	3	3 9/16	4 3/4	1 1/2	3	2 7/16	4 3/4	1 1/2
3 1/2	3 7/8	5 3/8	1 1/2	3 1/2	3 7/8	5 3/8	1 1/2	3 1/2	2 9/16	5 3/8	1 1/2
4	4 1/4	6	1 5/8	4	4 1/4	6	1 5/8	4	2 7/8	6	1 5/8

For price list, see page 256.

HYDRAULIC SCREWED FLANGES

SEMI-STEEL AND CAST STEEL

800 POUNDS HYDRAULIC AMERICAN STANDARD

800 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)

500 Pounds Cold Water Working Pressure—Shock

800 Pounds Air or Gas Working Pressure—Temperature not Exceeding 100 deg. Fahr.

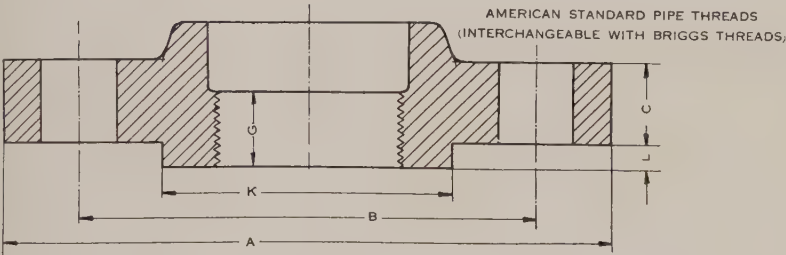


Fig. 5012

Size Inches	A	No. of Holes	Dia. of Holes	B	C Semi Steel	C Cast Steel	G	K	No. of Th'ds.	L
3/4	4	4	5/8	2 7/8	5/8	...	9/16	1 1/16	14	3/16
1	4 1/2	4	5/8	3 1/4	1 1/16	...	1 1/16	2	11 1/2	3/16
1 1/4	5	4	5/8	3 3/4	3/4	...	1 1/16	2 1/2	11 1/2	3/16
1 1/2	6	4	3/4	4 1/2	13/16	...	3/4	2 7/8	11 1/2	3/16
2	6 3/4	8	3/4	5 1/4	1 1/4	1	3/4	3 5/8	11 1/2	3/16
2 1/2	7 1/2	8	7/8	5 7/8	1 3/8	1 1/8	1 1/8	4 1/8	8	3/16
3	8 1/2	8	7/8	6 1/2	1 1/2	1 1/4	1 3/16	5	8	3/16
3 1/2	9 1/2	8	1	7 1/2	1 5/8	1 3/8	1 1/4	5 1/2	8	3/16
4	10 3/4	8	1	8 1/2	1 7/8	1 1/2	1 5/16	6 3/16	8	3/16
4 1/2	11 1/2	8	1	9 1/4	2	1 5/8	1 3/8	6 3/4	8	3/16
5	13	8	1 1/8	10 1/2	2 1/8	1 3/4	1 3/8	7 5/16	8	3/16
6	14	12	1 1/8	11 1/2	2 1/4	1 7/8	1 1/2	8 1/2	8	3/16
7	15	12	1 1/8	12 1/2	2 3/8	2	1 5/8	9 5/8	8	1/4
8	16 1/2	12	1 1/4	13 3/4	2 1/2	2 1/8	1 11/16	10 5/8	8	1/4
9	18 1/2	16	1 1/4	15 1/2	2 3/4	2 3/8	1 13/16	11 5/8	8	1/4
10	20	16	1 3/8	17	2 7/8	2 1/2	1 15/16	12 3/4	8	1/4
12	22	20	1 3/8	19 1/4	3	2 5/8	2 1/8	15	8	1/4

For price list, see page 257.

Dimensions given are for semi-steel or cast steel.

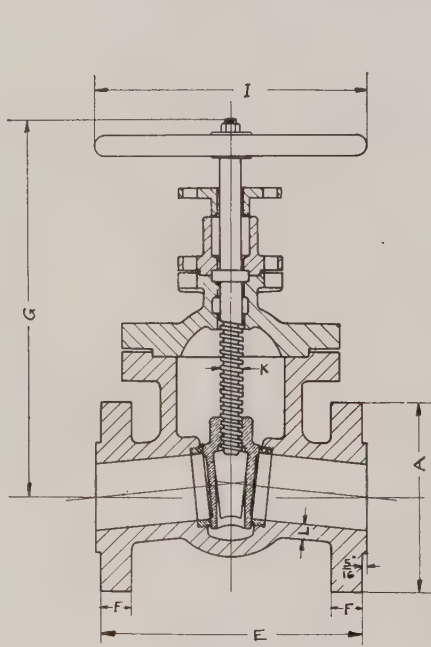
These flanges are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove faces, if so ordered.

Dimensions of these Special Facings on application.

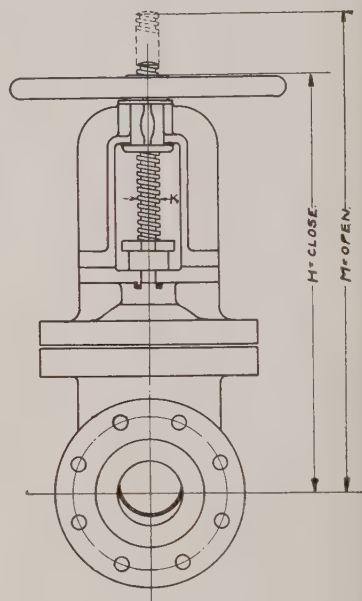
HYDRAULIC FLANGED GATE VALVES

No. 6 T

1000 POUNDS PITTSBURGH STANDARD
SEMI-STEEL. BRONZE MOUNTED. TAPER SEAT
1000 POUNDS WORKING PRESSURE—SHOCK



Inside Screw Valve
Fig. 676



Outside Screw and Yoke Valve
Fig. 677

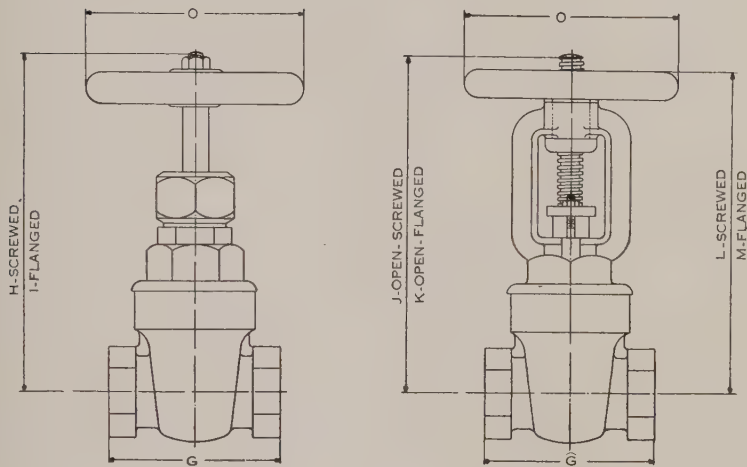
"O" = Number of turns to open

Size Inches	A	E	F	G	H	I	K	L	O	M
3/4	4 1/2	6 1/4	1	9 1/2	...	5	11/16	7/16	7	...
1	5	7 1/2	1 1/8	11 5/8	12 7/8	6	3/4	1 1/2	8	14 3/4
1 1/4	5 1/2	8 1/2	1 1/4	15 1/4	15 5/8	7 1/2	7/8	5/8	12	18 5/8
1 1/2	6 1/2	8 1/2	1 3/8	15 1/4	15 5/8	7 1/2	7/8	5/8	12	18 5/8
2	7 1/2	10	1 1/2	17 5/8	17 1/4	9	1	1 1/8	8	20 1/4
2 1/2	8	12	1 5/8	21 1/4	20 11/16	12	1 1/8	1 1/8	9	24
3	9	14	1 3/4	21 3/8	20 15/16	12	1 1/8	1 1/8	12	25
4	10 1/2	16	2	22 1/2	22 1/2	15	1 1/4	1	8	27 3/4
5	12 1/2	19 1/4	2 3/8	24 3/4	28 3/4	18	1 1/2	1 1/8	11	34 3/4
6	14 1/2	20	2 1/2	28 3/8	31 1/2	21	1 3/4	1 1/4	13	39 1/4
8	17 1/2	24	2 3/4	34	37 15/16	27	2	1 5/8	15	46 5/8
10	21	29	3	41 1/4	47 15/16	36	2 1/2	2 1/8	20	60 1/4
12	23 1/2	34	3 1/4	Geared	Geared	Geared	2 3/4	2 1/2	26	70 1/2

The bore of these valves is made to suit XX strong pipe.
For drilling, see page 490. For description, see page 260. For price list, see page 261.

HYDRAULIC BRONZE TAPER SEAT
GATE VALVES

1000 POUNDS PITTSBURGH STANDARD
1000 POUNDS WORKING PRESSURE—SHOCK



E= FACE TO FACE OF FLANGED VALVE
D= THICKNESS OF FLANGE
 $\frac{5}{16}$ "=HEIGHT OF MALE

Inside Screw Valve
Fig. 6031

Outside Screw and Yoke Valve
Fig. 6032

FLANGED OR SCREWED

Size Inches	Diam. of Flange	D	E	G	H	I	J	K	L	M	O
$\frac{1}{2}$	...	...	...	$3\frac{3}{4}$	$6\frac{15}{16}$	....	....	....	....	....	$4\frac{1}{4}$
$\frac{3}{4}$	$4\frac{1}{2}$	$\frac{5}{8}$	5	4	$7\frac{13}{16}$	$8\frac{1}{2}$	....	....	....	....	5
1	5	$\frac{3}{4}$	$5\frac{3}{4}$	$4\frac{3}{4}$	$9\frac{3}{8}$	$9\frac{5}{8}$	$11\frac{1}{4}$	$11\frac{1}{2}$	$9\frac{9}{16}$	$9\frac{13}{16}$	6
$1\frac{1}{4}$	$5\frac{1}{2}$	$\frac{7}{8}$	$6\frac{3}{4}$	$5\frac{3}{4}$	$11\frac{1}{8}$	$11\frac{13}{32}$	$13\frac{3}{8}$	$13\frac{31}{32}$	$11\frac{5}{16}$	$11\frac{13}{32}$	$7\frac{1}{2}$
$1\frac{1}{2}$	$6\frac{1}{2}$	1	$7\frac{3}{4}$	$6\frac{1}{2}$	$11\frac{9}{16}$	$11\frac{7}{8}$	14	$14\frac{5}{16}$	$11\frac{3}{4}$	$12\frac{1}{16}$	$7\frac{1}{2}$
2	$7\frac{1}{2}$	$1\frac{1}{8}$	$8\frac{1}{2}$	$7\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{13}{16}$	$16\frac{3}{4}$	17	$13\frac{3}{4}$	14	9

For prices, see page 262.

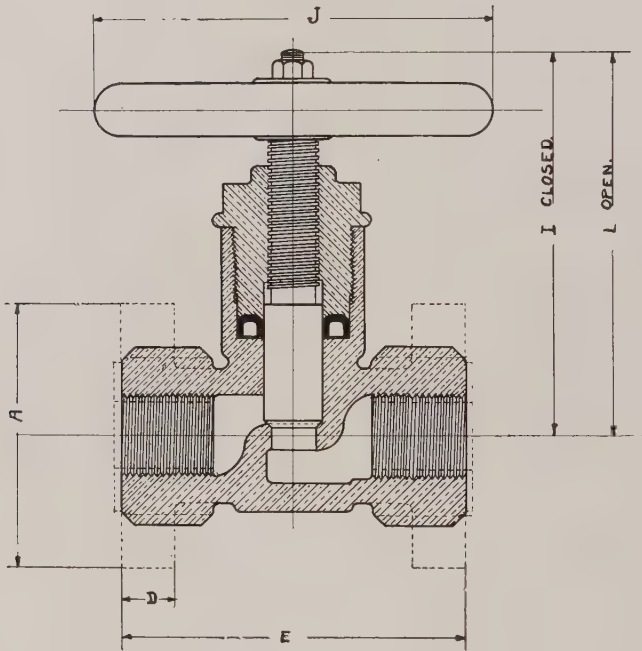
For drilling, see page 490.

HYDRAULIC BRONZE PLUG VALVES

1000 POUNDS PITTSBURGH STANDARD

1000 POUNDS WORKING PRESSURE—SHOCK

FLANGED OR SCREWED



Plug Valve
Fig. 672

Size Inches	A	D	E	I	J	L
1	5	$\frac{3}{4}$	$5\frac{1}{4}$	$6\frac{5}{8}$	6	7
$1\frac{1}{4}$	$5\frac{1}{2}$	$\frac{7}{8}$	$6\frac{1}{2}$	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{5}{8}$
$1\frac{1}{2}$	$6\frac{1}{2}$	1	7	$8\frac{7}{16}$	9	$8\frac{15}{16}$
2	$7\frac{1}{2}$	$1\frac{1}{8}$	$8\frac{3}{4}$	$8\frac{13}{16}$	9	$9\frac{7}{16}$
$2\frac{1}{2}$	8	$1\frac{1}{4}$	9	$9\frac{15}{16}$	12	$10\frac{13}{16}$

For standard drilling, see page 490.
For price list, see page 264.

HYDRAULIC BRONZE STRAIGHTWAY
COCKS

BALANCED KEY

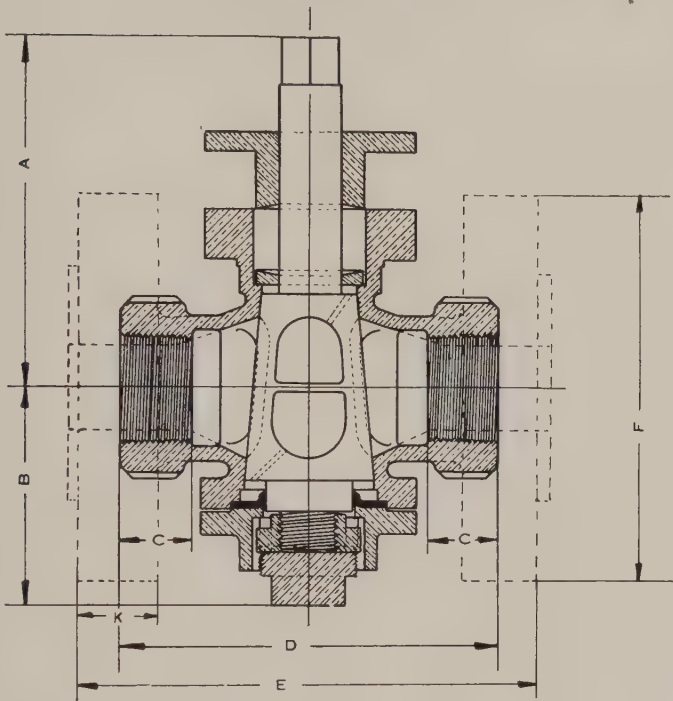


Fig. 526
Flanged or Screwed

Size Inches	A	B	C	D	E	F	K
$\frac{1}{2}$	4	$2\frac{11}{32}$	$\frac{11}{16}$	$3\frac{3}{8}$	...	...	...
$\frac{3}{4}$	$4\frac{13}{16}$	$2\frac{7}{8}$	$\frac{3}{4}$	4	...	...	...
1	$5\frac{31}{32}$	$3\frac{5}{32}$	$\frac{7}{8}$	$4\frac{1}{2}$	...	...	...
$1\frac{1}{4}$	$6\frac{3}{32}$	$3\frac{9}{16}$	1	5	$6\frac{1}{2}$	5	$\frac{3}{4}$
$1\frac{1}{2}$	$6\frac{1}{2}$	$4\frac{1}{16}$	$1\frac{1}{8}$	$5\frac{3}{8}$	$7\frac{5}{8}$	6	$\frac{13}{16}$
2	$7\frac{1}{2}$	$4\frac{11}{16}$	$1\frac{1}{4}$	8	$8\frac{3}{4}$	$6\frac{1}{2}$	$\frac{7}{8}$
$2\frac{1}{2}$	$9\frac{1}{8}$	$5\frac{1}{2}$	$1\frac{3}{8}$	9	$9\frac{7}{8}$	$7\frac{1}{2}$	1
3	11	$6\frac{5}{16}$	$1\frac{1}{2}$	11	11	$8\frac{1}{4}$	$1\frac{1}{8}$
4	$11\frac{1}{2}$	$7\frac{15}{32}$	$1\frac{5}{8}$	$12\frac{1}{2}$	$13\frac{1}{2}$	10	$1\frac{1}{4}$

For description, see page 263.

NOTE.—These cocks are made for various pressures. When ordering specify pressure.

STRAIGHT WAY HYDRAULIC BRONZE COCKS—SCREWED ENDS

1000 POUNDS WORKING PRESSURE—SHOCK

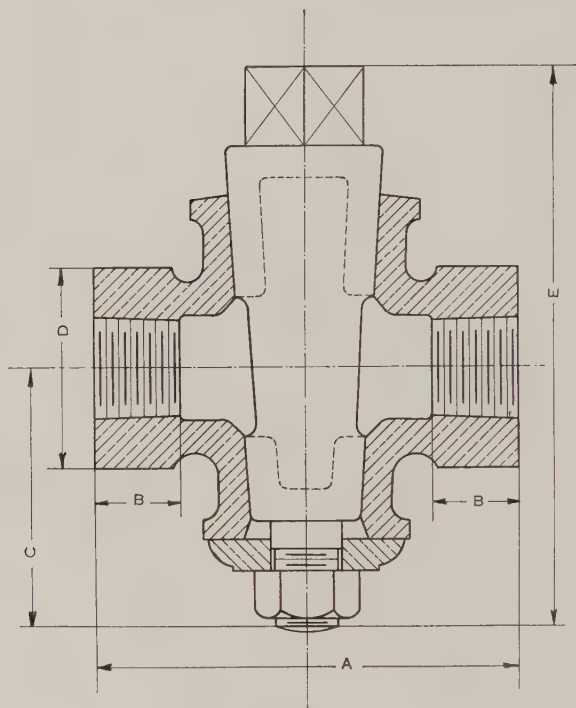


Fig. 6030

Size	A	B	C	D	E
$\frac{1}{2}$	$3\frac{3}{8}$	$\frac{11}{16}$	2	$1\frac{5}{8}$	$4\frac{3}{8}$
$\frac{3}{4}$	$3\frac{7}{8}$	$\frac{13}{16}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$5\frac{3}{8}$
1	4	$\frac{7}{8}$	$2\frac{11}{32}$	$2\frac{1}{4}$	$5\frac{3}{16}$
$1\frac{1}{4}$	$4\frac{9}{16}$	$\frac{7}{8}$	$2\frac{3}{4}$	3	$6\frac{1}{16}$
$1\frac{1}{2}$	$4\frac{3}{4}$	$\frac{15}{16}$	$2\frac{29}{32}$	$3\frac{3}{8}$	$6\frac{9}{16}$
2	$5\frac{7}{8}$	$1\frac{1}{4}$	$3\frac{5}{8}$	$4\frac{1}{8}$	$8\frac{1}{8}$

For price list, see page 262.

LARGE TANNER OPERATING VALVE WITH CENTERING ACTUATING CYLINDER

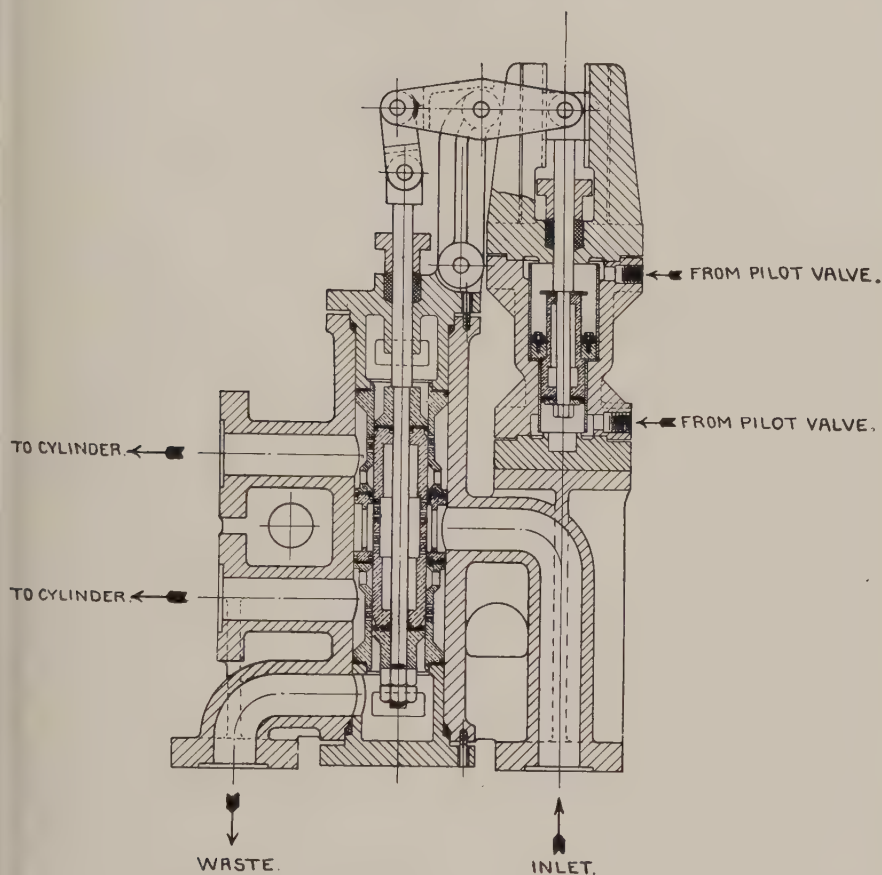


Fig. 665

The actuating cylinder shown above is worked in conjunction with a small pilot valve which is so arranged that when on center, pressure is maintained in both ends of the actuating cylinder, and when off center one way, the pressure is exhausted from one end of the actuating cylinder, but is still maintained on the other end. The differential areas created cause the piston to move and transmit motion to the main valve through the walking beam. Upon centering the pilot valve and restoring pressure to both ends of the actuating cylinder the differential is reversed in effect and the piston travels to center position.

TANNER OPERATING VALVE

THREE-WAY
(PATENTED)

1000 POUNDS WORKING PRESSURE—HYDRAULIC

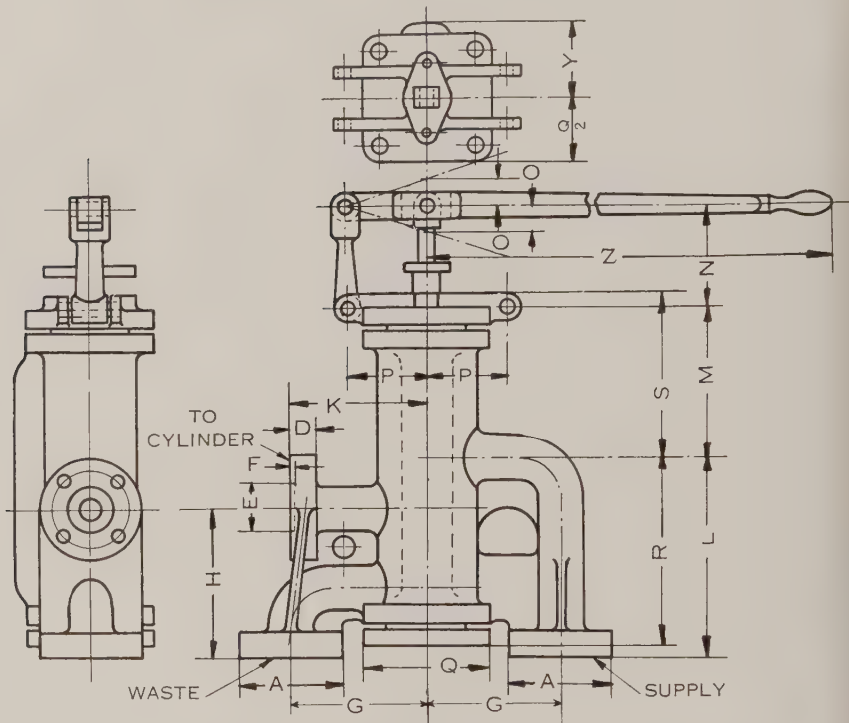


Fig. 6033

Size Inche.	A	D	G	H	K	L	M	N	O	P	Y	Z
$\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{7}{8}$	$5\frac{1}{4}$	$8\frac{3}{16}$	$5\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{1}{16}$	$3\frac{3}{8}$	$3\frac{1}{8}$	$14\frac{1}{2}$
1	5	$1\frac{3}{8}$	7	8	7	$10\frac{3}{4}$	$7\frac{3}{8}$	$5\frac{5}{8}$	$1\frac{1}{2}$	$4\frac{1}{4}$	$3\frac{3}{4}$	$24\frac{1}{2}$
$1\frac{1}{4}$	$5\frac{1}{2}$	$1\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{3}{4}$	$7\frac{3}{4}$	$11\frac{3}{4}$	8	$6\frac{3}{8}$	$1\frac{5}{8}$	$4\frac{5}{8}$	$4\frac{3}{16}$	$30\frac{1}{2}$
$1\frac{1}{2}$	$6\frac{1}{2}$	$1\frac{5}{8}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$8\frac{1}{2}$	$12\frac{5}{8}$	$8\frac{1}{4}$	$6\frac{3}{8}$	$1\frac{5}{8}$	5	$4\frac{3}{4}$	$36\frac{1}{2}$
2	$7\frac{1}{2}$	$1\frac{3}{4}$	$10\frac{1}{2}$	11	$10\frac{1}{2}$	$15\frac{1}{2}$	$9\frac{11}{16}$	$7\frac{1}{16}$	$1\frac{7}{8}$	$5\frac{5}{8}$	$5\frac{1}{2}$	$38\frac{1}{2}$
$2\frac{1}{2}$	8	$1\frac{7}{8}$	11	$11\frac{1}{2}$	11	$16\frac{1}{4}$	$10\frac{1}{2}$	$7\frac{1}{2}$	$1\frac{7}{8}$	6	$6\frac{3}{8}$	$40\frac{1}{2}$
3	9	2	$11\frac{1}{2}$	12	$12\frac{3}{4}$	$17\frac{1}{8}$	$11\frac{7}{8}$	$8\frac{3}{8}$	$2\frac{3}{8}$	$6\frac{5}{8}$	$7\frac{3}{8}$	$42\frac{1}{2}$
4	$10\frac{1}{2}$	$2\frac{1}{4}$	15	$16\frac{7}{8}$	15	$22\frac{7}{8}$	14	...	3	...	$9\frac{3}{8}$	...

The bore of these valves is made to suit X strong pipe.
For standard drilling, see page 490. For description, see page 265.
For price list, see page 271.
For repair parts, see page 553.

TANNER OPERATING VALVE
FOUR-WAY
PATENTED
1000 POUNDS WORKING PRESSURE -HYDRAULIC

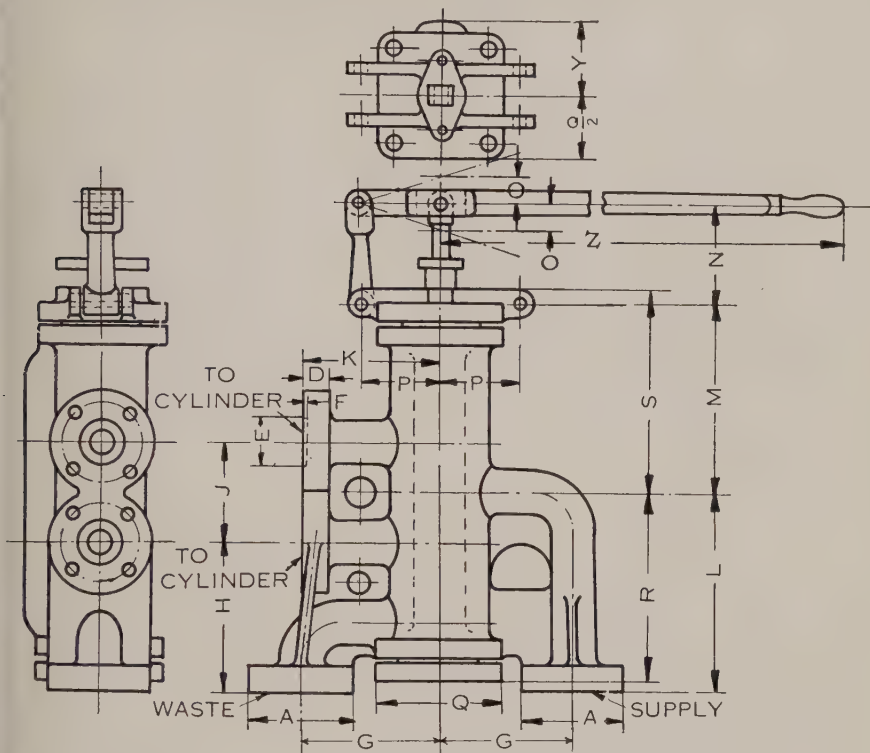


Fig. 6034

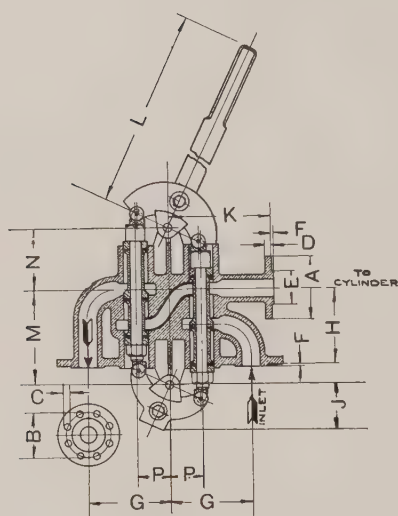
Size Inches	A	D	G	H	J	K	L	M	N	O	P	Y	Z
3/4	4 1/2	1 1/4	5 1/4	5 7/8	4 5/8	5 1/4	8 3/16	7 9/16	4 1/2	1 1/16	3 3/8	3 1/8	14 1/2
1	5	1 3/8	7	8	5 1/2	7	10 3/4	10 1/8	5 5/8	1 1/2	4 1/4	3 3/4	24 1/2
1 1/4	5 1/2	1 1/2	7 3/4	8 3/4	6	7 3/4	11 3/4	11	6 3/8	1 5/8	4 5/8	4 3/8	30 1/2
1 1/2	6 1/2	1 5/8	8 1/2	9 1/2	6 1/4	8 1/2	12 5/8	11 7/8	6 3/8	1 5/8	5	4 3/4	36 1/2
2	7 1/2	1 3/4	10 1/2	11	9	10 1/2	15 1/2	13 11/16	7 1/16	1 7/8	5 5/8	5 1/2	38 1/2
2 1/2	8	1 7/8	11	11 1/2	9 1/2	11	16 1/4	14 1/4	7 1/2	1 7/8	6	6 3/8	40 1/2
3	9	2	11 1/2	12	10 1/4	12 3/4	17 1/8	16 3/4	8 3/8	2 3/8	6 5/8	7 3/8	42 1/2
4	10 1/2	2 1/4	15	16 1/8	13 1/2	15	22 7/8	20 1/4	...	3	...	9 3/8	...

The bore of these valves is made to suit X strong pipe.
For standard drilling, see page 490. For description, see page 265.
For price list, see page 271.
For repair parts, see page 552.

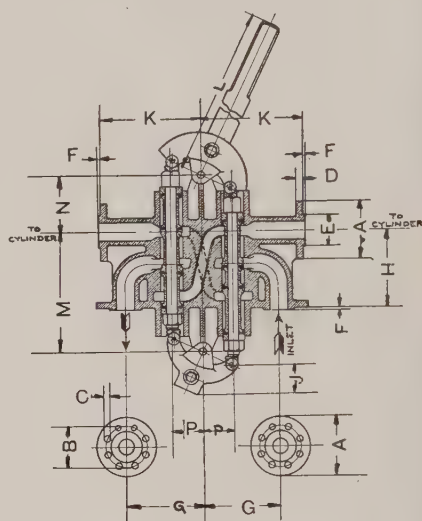
AIKEN OPERATING VALVES

BRONZE. FLANGED

1000 POUNDS HYDRAULIC PRESSURE—SHOCK



Three-Way
Fig. 696



Four-Way
Fig. 697

Size...ins.	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	Size...ins.	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
A	3 1/2	4	5	5 1/4	5 1/2	6 1/2	7 1/2	8	9 1/2	A	3 1/2	4	5	5 1/4	5 1/2	6 1/2	7 1/2	8	9 1/2
B	2 1/2	2 7/8	3 1/2	3 3/4	4	4 3/4	5 1/2	6 1/4	7 1/2	B	2 1/2	2 7/8	3 1/2	3 3/4	4	4 3/4	5 1/2	6 1/4	7 1/2
No. Holes	4	4	4	4	4	4	4	8	8	No. Holes	4	4	4	4	4	4	4	8	8
C		7/16	9/16	11/16	13/16	15/16	17/16	19/16	21/16	C	7/16	9/16	11/16	13/16	15/16	17/16	19/16	21/16	
D		3/8	1/2	1/2	5/8	3/4	7/8	1	1 1/8	D	3/8	1/2	1/2	5/8	3/4	7/8	1	1 1/8	
E	1 3/4	2	2	2 1/2	3	3 1/2	4	5	6	E	1 3/4	2	2	2 1/2	3	3 1/2	4	5	6
F	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	F	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
G	4 3/8	5 1/8	6	6 3/4	7 3/4	8 1/2	11	11	13 5/8	G	4 3/8	5 1/8	6	6 3/4	7 3/4	8 1/2	11	11	13 5/8
H	3 1/2	4 3/8	4 1/2	5 1/2	5 3/4	6 1/2	8 1/8	9	12	H	4	4 5/8	5 3/4	6	6 5/8	7 3/8	9 1/4	10 5/8	14
J	2 3/4	2 7/8	3	3 1/4	4	4 3/4	5 1/2	7 1/8	7 1/2	J	2 3/4	2 7/8	3	3 1/4	4	4 3/4	5 1/2	7 1/8	7 1/2
K	5 1/4	6 1/4	7 1/2	8 1/4	9 1/2	10 3/4	13	14	17	K	5 1/4	6 1/4	7 3/4	8	9 1/2	11 1/4	12 3/4	15	17 5/8
L	24	24	36	36	36	48	48	60	72	L	24	24	36	36	36	48	48	60	72
M	4 1/16	5 3/32	6 3/8	7 1/32	7 13/32	9 7/8	11	11 11/32	14 1/32	M	6 1/8	8 3/32	9 1/8	10 5/32	11 1/8	12 13/32	15 1/4	16 1/16	20 1/2
N	3 1/16	3 3/32	4 3/16	4 1/32	5 13/32	6 1/4	6 7/8	8 1/16	8 3/32	N	2 7/8	3 3/32	4 3/16	4 1/32	5 3/8	6 11/16	7	8 3/16	8 3/32
P	1 5/8	1 11/16	2 1/4	2 1/2	2 5/8	3 3/8	3 3/4	4 1/2	5 5/8	P	1 5/8	1 11/16	2 1/4	2 1/2	2 5/8	3 3/8	3 3/4	4 1/2	5 5/8

For description, see page 272.

For price list, see page 274.

For repair parts, see pages 556 and 557.

AIKEN OPERATING VALVES

BRONZE. SCREWED.

1000 POUNDS HYDRAULIC PRESSURE—SHOCK

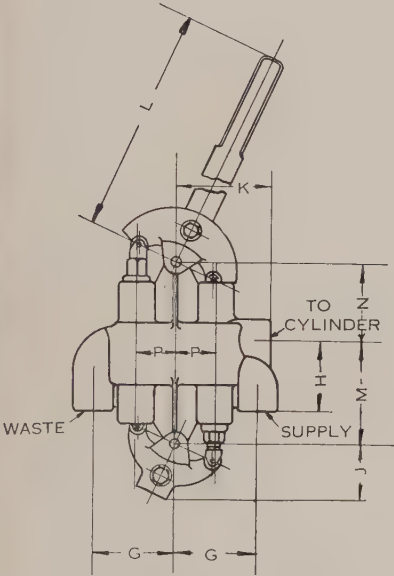


Fig. 6035
Three-Way

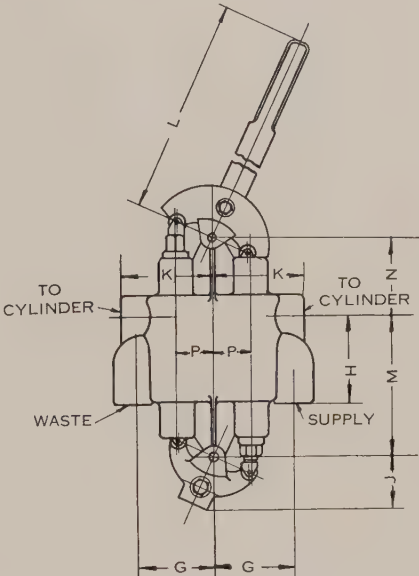


Fig. 6036
Four-Way

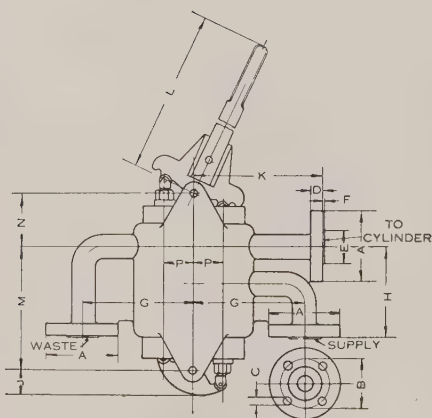
Size. inches	1/2	3/4	1	1 1/4	1 1/2	2	Size. inches	1/2	3/4	1	1 1/4	1 1/2	2
G	3 1/2	4 1/4	4 3/4	5 1/2	6 1/8	7 1/2	G	3 1/2	4 1/4	4 3/4	5 1/2	6 1/8	7 1/2
H	2 1/2	3 1/2	4	4 1/2	5	6	H	2 1/4	4 3/4	5 1/8	6	6 3/4	8
J	2 3/4	2 7/8	3	3 1/4	4	4 3/4	J	2 3/4	2 7/8	3	3 1/4	4	4 3/4
K	4 3/16	4 1/4	4 3/4	5 1/2	6 1/8	7 1/2	K	4 3/16	4 1/4	4 3/4	5 1/2	6 1/8	7 1/2
L	24	24	36	36	36	48	L	24	24	36	36	36	48
M	4	5 1/4	6 11/32	7 1/16	7 23/32	9 1/4	M	6 1/8	7 9/16	8 15/32	9 1/16	10 3/16	12 7/8
N	2 7/8	4 3/8	4 15/32	5	5 13/32	6 7/8	N	2 7/8	4 1/4	4 25/32	5 1/8	5 9/16	6 7/8
P	1 5/8	1 31/32	2 1/4	2 17/32	2 13/16	3 3/8	P	1 5/8	1 31/32	2 1/4	2 17/32	2 13/16	3 3/8

For description, see page 272.
For price list, see page 274.

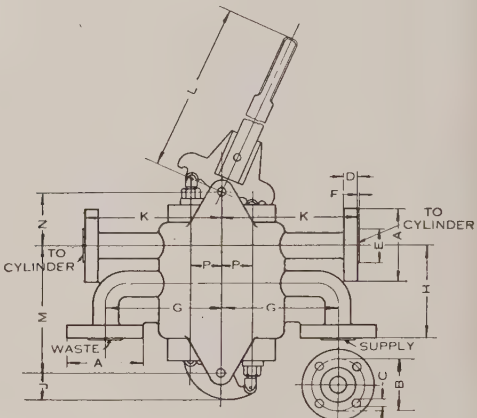
AIKEN OPERATING VALVES

SEMI-STEEL. FLANGED.

1000 POUNDS HYRAULIC PRESSURE—SHOCK



Three-Way
Fig. 6037



Four-Way
Fig. 6038

Size...ins.										Size...ins.									
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
A	4	5	5 1/4	5 1/2	6 1/2	7 1/2	8	8 1/2	10 1/2	A	4	5	5 1/4	5 1/2	6 1/2	7 1/2	8	8 1/2	10 1/2
B	2 7/8	3 1/2	3 3/4	4	4 3/4	5 1/2	6 1/4	6 3/4	8 1/2	B	2 7/8	3 1/2	3 3/4	4	4 3/4	5 1/2	6 1/4	6 3/4	8 1/2
No. Holes	4	4	4	4	4	4	8	8	8	No. Holes	4	4	4	4	4	4	8	8	8
C	9/16	11/16	11/16	11/16	13/16	15/16	15/16	15/16	15/16	C	9/16	11/16	11/16	11/16	13/16	15/16	15/16	15/16	15/16
D	3/4	5/8	1	1 1/4	1 1/4	1 3/8	1 5/8	1 7/8	2 1/4	D	3/4	5/8	1	1 1/4	1 1/4	1 3/8	1 5/8	1 7/8	2 1/4
E	2	2	2 1/2	3	3 1/2	4	5	5 1/2	6 1/2	E	2	2	2 1/2	3	3 1/2	4	5	5 1/2	6 1/2
F	3/32	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	F	3/32	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
G	5 1/8	7 1/8	8 3/8	9 3/8	10 3/8	12 1/8	13 3/8	15 7/8	19 1/4	G	5 1/8	7 1/8	8 3/8	9 3/8	10 3/8	12 1/8	13 3/8	15 7/8	19 1/4
H	4 1/8	5 1/4	6 1/4	7	7 7/8	9 1/2	10 3/4	12 3/8	14 7/8	H	4 1/8	5 1/4	6 1/4	7	7 7/8	9 1/2	10 3/4	12 3/8	14 7/8
J	1 15/16	2	2	2 3/4	2 3/4	3	4	4 1/8	4	J	1 15/16	2	2	2 3/4	2 3/4	3	4	4 1/8	4
K	6 7/8	8 3/8	9 3/4	10 3/4	11 7/8	13 3/8	15 3/8	17 7/8	20 3/4	K	6 7/8	8 3/8	9 3/4	10 3/4	11 7/8	13 3/8	15 3/8	17 7/8	20 3/4
L	36	36	44	44	44	50	50	62	74	L	36	36	44	44	44	50	50	62	74
M	4 3/32	5 5/8	6 1/8	7 1/8	8 3/8	10	11 3/8	12 3/8	15 5/16	M	5 3/32	7 7/8	9 1/8	10 1/8	12 1/4	14 1/2	16 5/8	19	23 3/16
N	2 1/32	3 3/8	3 11/16	4 3/8	4 1/2	5 1/2	6 1/8	6 3/4	7 11/16	N	2 1/32	3 3/8	3 11/16	4 3/8	4 1/2	5 1/2	6 1/8	6 3/4	7 11/16
P	1 5/8	2	2 1/4	2 1/2	2 5/8	3 3/8	4	4 1/2	5 3/8	P	1 5/8	2	2 1/4	2 1/2	2 5/8	3 3/8	4	4 1/2	5 3/8

For description, see page 272.

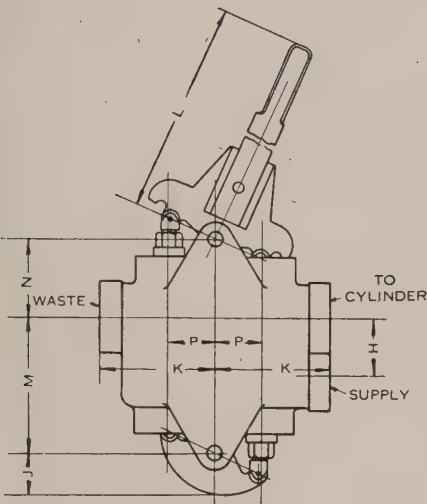
For price list, see page 275.

For repair parts, see pages 554 and 555.

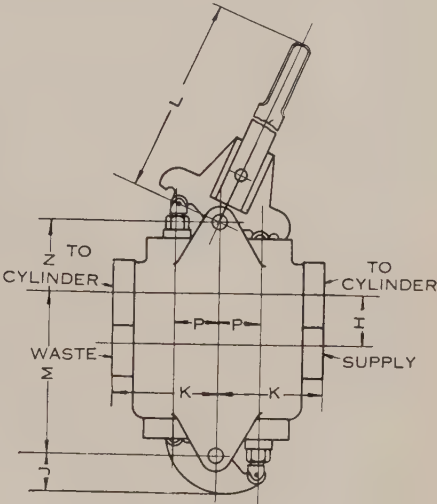
AIKEN OPERATING VALVES

SEMI-STEEL. SCREWED.

1000 POUNDS HYDRALUIC PRESSURE—SHOCK



Three-Way
Fig. 6039



Four-Way
Fig. 6040

Size Inches	H	J	K	L	M	N	P	Size Inches	H	J	K	L	M	N	P
1/2	1 5/8	1 15/16	4	36	4 5/32	2 17/32	1 5/8	1/2	1 5/8	1 15/16	4	36	5 23/32	2 17/32	1 5/8
3/4	2 1/4	2	4 7/8	36	5 5/8	3 3/8	2	3/4	2 1/4	2	4 7/8	36	7 7/8	3 3/8	2
1	2 3/4	2	5 5/8	44	6 9/16	3 13/16	2 1/4	1	2 3/4	2	5 5/8	44	9 5/16	3 13/16	2 1/4
1 1/4	3 1/4	2 3/4	6 3/8	44	7 11/32	4 3/32	2 1/2	1 1/4	3 1/4	2 3/4	6 3/8	44	10 13/32	3 31/32	2 1/2
1 1/2	3 7/8	2 3/4	7 3/16	44	8 3/8	4 1/2	2 13/16	1 1/2	3 7/8	2 3/4	7 3/16	44	12 1/4	4 1/2	2 13/16
2	4 1/2	3	8 3/8	50	10	5 1/2	3 3/8	2	4 1/2	3	8 3/8	50	14 1/2	5 1/2	3 3/8
2 1/2	5 1/4	4	9 5/8	50	11 3/8	6 1/8	4	2 1/2	5 1/4	4	9 5/8	50	16 5/8	6 1/8	4
3	6 3/8	4 1/8	11 1/4	62	12 7/8	6 1/4	4 1/2	3	6 3/8	4 1/8	11 1/4	62	19	6 1/2	4 1/2
4	7 7/8	4	13 5/8	74	15 9/16	7 11/16	5 5/8	4	7 7/8	4	13 5/8	74	23 7/16	7 11/16	5 5/8

For description, see page 272.
For price list, see page 275.

HYDRAULIC SPRING CUSHIONS

1000 POUNDS PITTSBURGH STANDARD

1000 POUNDS HYDRAULIC WORKING PRESSURE—SHOCK

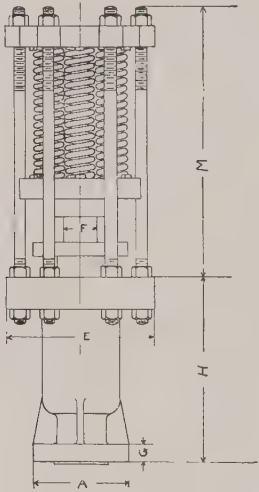


Fig. 666

Size.....inches	1	1¼	1½	2	2½	3	4
A	5	5½	6½	7½	8	9	10½
E	9¾	9¾	9¾	11	11	16½	16½
F	1½	1½	1½	2¼	2¼	3¾	3¾
G	1⅛	1¼	1⅜	1½	1⅝	1¾	2
H	13⅜	13⅜	13⅜	16	16	20⅜	20⅜
M	22⅛	22⅛	22⅛	24	24	47¾	4 ¾

For standard drilling, see page 490.

For price list, see page 276.

These valves can be designed for higher pressures, thus changing drilling and general dimensions from that shown above.

When ordering state the pressure desired.

HYDRAULIC FLANGED TEES

1000 POUNDS PITTSBURGH STANDARD

SEMI-STEEL

1000 POUNDS WORKING PRESSURE—SHOCK

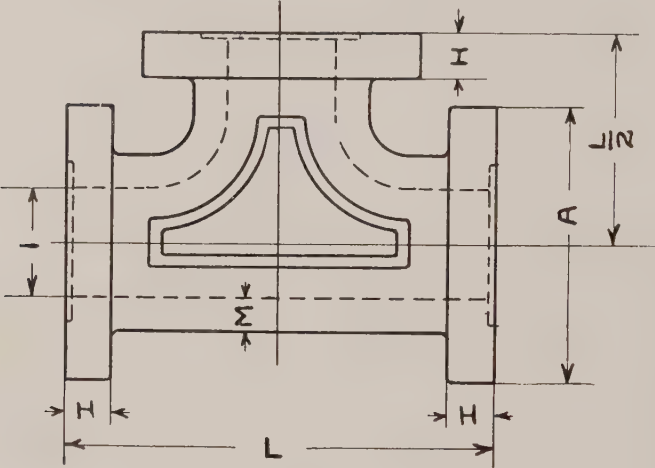


Fig. 61

“H”=Thickness of plain face flange

Size Inches	A	H	I	L	M
1	5	1 ³ / ₈	9 ⁹ / ₁₆	11	1 ¹ / ₂
1 ¹ / ₄	5 ¹ / ₂	1 ¹ / ₂	7 ⁷ / ₈	12	1 ¹ / ₂
1 ¹ / ₂	6 ¹ / ₂	1 ⁵ / ₈	1 ¹ / ₈	13	5 ⁵ / ₈
2	7 ¹ / ₂	1 ³ / ₄	1 ¹ / ₂	14	5 ⁵ / ₈
2 ¹ / ₂	8	1 ⁷ / ₈	1 ³ / ₄	15	2 ⁵ / ₃₂
3	9	2	2 ¹ / ₄	16	2 ⁷ / ₃₂
3 ¹ / ₂	9 ³ / ₄	2 ¹ / ₈	2 ³ / ₄	17	1
4	10 ¹ / ₂	2 ¹ / ₄	3 ¹ / ₈	18	1 ¹ / ₈
4 ¹ / ₂	11 ³ / ₄	2 ¹ / ₂	3 ⁵ / ₈	20	1 ⁵ / ₁₆
5	12 ¹ / ₂	2 ⁵ / ₈	4 ¹ / ₈	21	1 ³ / ₈
6	14 ¹ / ₂	2 ³ / ₄	5 ¹ / ₈	23	1 ⁹ / ₁₆
7	16	2 ⁷ / ₈	6	25	1 ⁷ / ₈
8	17 ¹ / ₂	3	6 ⁷ / ₈	27	2 ¹ / ₈
9	19 ¹ / ₂	3 ¹ / ₈	8	29	2 ¹ / ₄
10	21	3 ¹ / ₄	9	31	2 ¹ / ₂
12	23 ¹ / ₂	3 ¹ / ₂	11	35	2 ³ / ₄

Bore of all fittings is made to suit the inside diameter of XX pipe.

For drilling, see page 490.

For price list, see page 277.

HYDRAULIC ROUGH BRONZE
SCREWED ELBOWS, TEES AND
45 DEGREE ELBOWS
1000 POUNDS WORKING PRESSURE—SHOCK

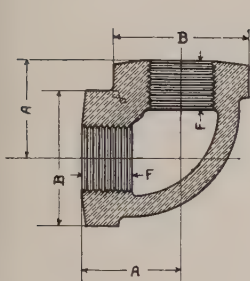


Fig. 673
90° Elbow

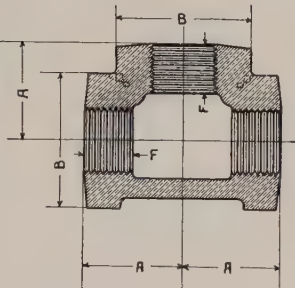


Fig. 674
Tee

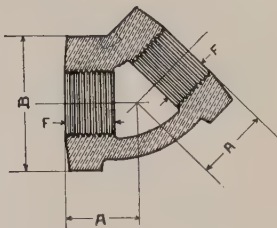


Fig. 675
45° Elbow

Size Inches	A	B	F	Size Inches	A	B	F	Size Inches	A	B	F
1/4	7/8	1 1/8	1/2	1/4	7/8	1 1/8	1/2	1/4	3/4	1 1/8	1/2
3/8	1	1 3/8	9/16	3/8	1	1 3/8	9/16	3/8	1 3/8	1 3/8	9/16
1/2	1 1/4	1 5/8	11/16	1/2	1 1/4	1 5/8	11/16	1/2	1	1 5/8	11/16
3/4	1 1/2	2 1/16	3/4	3/4	1 1/2	2 1/16	3/4	3/4	1 1/8	2 1/16	3/4
1	1 3/4	2 5/16	7/8	1	1 3/4	2 5/16	7/8	1	1 5/16	2 5/16	7/8
1 1/4	2	2 9/16	1	1 1/4	2	2 9/16	1	1 1/4	1 1/2	2 9/16	1
1 1/2	2 3/16	3 3/16	1 1/8	1 1/2	2 3/16	3 3/16	1 1/8	1 1/2	1 5/8	3 3/16	1 1/8
2	2 1/2	3 15/16	1 1/4	2	2 1/2	3 15/16	1 1/4	2	1 7/8	3 15/16	1 1/4
2 1/2	2 15/16	4 11/16	1 3/8	2 1/2	2 15/16	4 11/16	1 3/8	2 1/2	2 1/8	4 11/16	1 3/8
3	3 9/16	5 7/16	1 1/2	3	3 9/16	5 7/16	1 1/2	3	2 7/8	5 7/16	1 1/2

For price list, see page 264.

HYDRAULIC SCREWED FLANGES

1000 POUND PITTSBURGH STANDARD SEMI-STEEL

1000 POUNDS WORKING PRESSURE—SHOCK

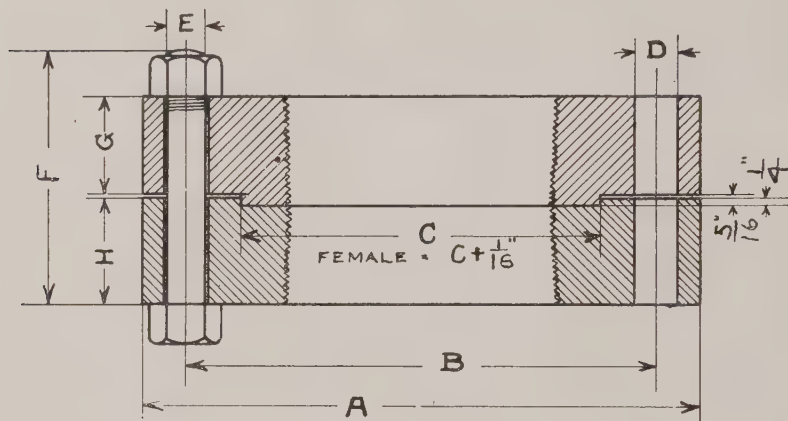


Fig. 63

"K"=Number of holes

"H"=Thickness of plain face flange

Size Inches	A	K	D	B	C	G	H	E	F
$\frac{3}{4}$	$4\frac{1}{2}$	4	$\frac{9}{16}$	$3\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$
1	5	4	$\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$\frac{5}{8}$	$4\frac{1}{4}$
$1\frac{1}{4}$	$5\frac{1}{2}$	4	$\frac{3}{4}$	4	$2\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{7}{8}$	$\frac{5}{8}$	$4\frac{1}{2}$
$1\frac{1}{2}$	$6\frac{1}{2}$	4	$\frac{7}{8}$	$4\frac{3}{4}$	3	$1\frac{7}{8}$	$2\frac{1}{8}$	$\frac{3}{4}$	5
2	$7\frac{1}{2}$	4	1	$5\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{8}$	$2\frac{3}{8}$	$\frac{7}{8}$	$5\frac{3}{4}$
$2\frac{1}{2}$	8	4	1	6	4	$2\frac{3}{8}$	$2\frac{5}{8}$	$\frac{7}{8}$	$6\frac{1}{4}$
3	9	8	$\frac{7}{8}$	7	$4\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$\frac{3}{4}$	$6\frac{1}{4}$
$3\frac{1}{2}$	$9\frac{3}{4}$	8	1	$7\frac{1}{2}$	$5\frac{1}{4}$	$2\frac{9}{16}$	$2\frac{11}{16}$	$\frac{7}{8}$	$6\frac{1}{2}$
4	$10\frac{1}{2}$	8	$1\frac{1}{8}$	$8\frac{1}{4}$	6	$2\frac{5}{8}$	$2\frac{7}{8}$	1	$6\frac{3}{4}$
$4\frac{1}{2}$	$11\frac{3}{4}$	8	$1\frac{1}{4}$	$9\frac{1}{4}$	$6\frac{5}{8}$	$2\frac{11}{16}$	$2\frac{15}{16}$	$1\frac{1}{8}$	7
5	$12\frac{1}{2}$	8	$1\frac{1}{4}$	10	$7\frac{1}{4}$	$2\frac{3}{4}$	3	$1\frac{1}{8}$	$7\frac{1}{4}$
6	$14\frac{1}{2}$	8	$1\frac{3}{8}$	$11\frac{3}{4}$	$8\frac{1}{2}$	$2\frac{7}{8}$	$3\frac{1}{8}$	$1\frac{1}{4}$	$7\frac{1}{2}$
7	16	12	$1\frac{3}{8}$	$13\frac{1}{4}$	$9\frac{5}{8}$	3	$3\frac{1}{4}$	$1\frac{1}{4}$	$7\frac{3}{4}$
8	$17\frac{1}{2}$	12	$1\frac{3}{8}$	$14\frac{3}{4}$	$10\frac{5}{8}$	$3\frac{1}{8}$	$3\frac{3}{8}$	$1\frac{1}{4}$	8
9	$19\frac{1}{2}$	12	$1\frac{1}{2}$	$16\frac{1}{4}$	$11\frac{3}{4}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$1\frac{3}{8}$	$8\frac{1}{2}$
10	21	12	$1\frac{1}{2}$	$17\frac{3}{4}$	$12\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{1}{2}$	$1\frac{3}{8}$	$8\frac{1}{2}$
12	$23\frac{1}{2}$	16	$1\frac{5}{8}$	$20\frac{3}{4}$	$15\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{1}{2}$	9

For price list, see page 278.

HYDRAULIC GATE VALVES—No. 6T

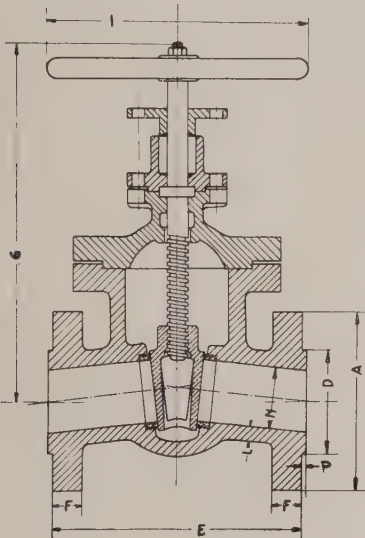
1200 POUNDS HYDRAULIC AMERICAN STANDARD

SEMI-STEEL. BRONZE MOUNTED

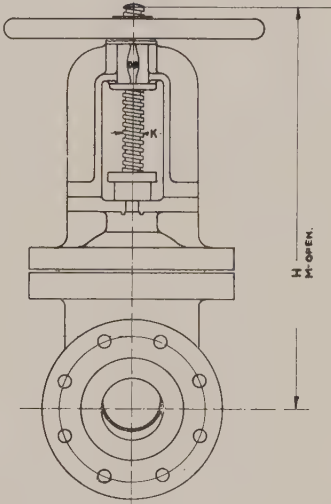
1200 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)

800 Pounds Cold Water Working Pressure—Shock

1200 Pounds Air or Gas Working Pressure—Temperature not Exceeding 100 deg. Fahr.



Inside Screw Valve
Fig. 6022



Outside Screw and Yoke Valve
Fig. 6023

O=Number of turns to open

Size Inches	G	H	M	A	D	E	F	N	L	I	K	O	P
1 1/2	15 1/4	15 5/8	18 5/8	6 3/4	27/8	11	1 1/4	1 1/2	5/8	7 1/2	7/8	12	3/16
2	17 5/8	17 1/4	20 1/4	7 3/4	3 5/8	12 1/2	1 3/8	1 7/8	1 1/16	9	1	8	3/16
2 1/2	21 1/4	20 1/16	24	8 1/2	4 1/8	13 1/2	1 1/2	2 1/4	3/4	12	1 1/8	9	3/16
3	21 3/8	20 15/16	25	9 1/2	5	14 1/2	1 5/8	2 3/4	7/8	12	1 1/8	12	3/16
4	22 1/2	22 1/2	27 3/4	11 1/2	6 3/16	17 1/2	2	3 3/4	1	15	1 1/4	8	3/16
5	24 3/4	28 3/4	34 3/4	13 1/2	7 5/16	21 1/2	2 1/4	4 3/4	1 1/8	18	1 1/2	11	3/16
6	28 3/8	31 1/2	39 1/4	15	8 7/2	23 1/2	2 3/8	5 3/4	1 1/4	21	1 3/4	13	3/16
8	34	37 13/16	46 5/8	18 1/2	10 5/8	28 1/2	2 3/4	7 5/8	1 5/8	27	2	15	1/4
10	41 1/4	47 15/16	60 1/4	21 1/2	12 3/4	32 1/2	3	9 3/4	2 1/8	36	2 1/2	20	1/4
12	Geared	Geared	70 1/2	24	15	37	3 1/8	11 3/4	2 1/2	Geared	2 3/4	26	1/4

The bore of these valves is made to suit XX strong pipe.

For drilling, see page 493.

For price list, see page 284.

These valves are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face if so ordered.

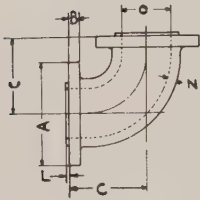
Dimensions of these Special Facings on application.

HYDRAULIC FLANGED FITTINGS
1200 POUNDS HYDRAULIC AMERICAN STANDARD
SEMI-STEEL AND CAST STEEL

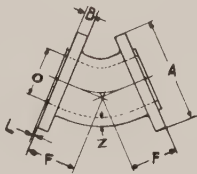
1200 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)

800 Pounds—Cold Water Working Pressure—Shock

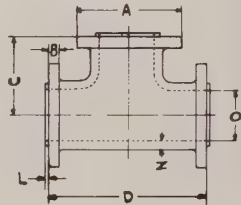
1200 Pounds—Air or Gas Working Pressure—Temperature not Exceeding 100 deg. Fahr.



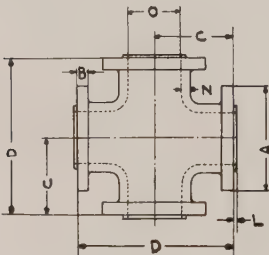
Std. Elbow
Fig. 6024



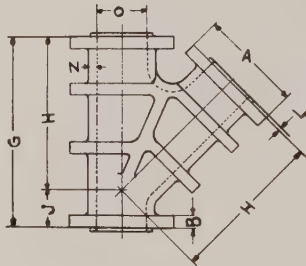
45° Elbow
Fig. 6025



Tee
Fig. 6026



Cross
Fig. 6027



Lateral
Fig. 6028

Size Inches	A	B Semi- Steel	B Cast Steel	C	D	F	G	H	J	N Semi- Steel	N Cast Steel	O	L
1/2	4 1/4	3/4	...	3 1/4	6 1/2	2 1/4	8 1/2	6 3/4	1 3/4	1 1/2	...	1 1/2	3/8
3/4	4 3/4	7/8	...	3 3/4	7 1/2	2 3/4	10	7 3/4	2 1/4	1 5/8	...	3/4	3/8
1	5 1/2	1	...	4 1/4	8 1/2	3 1/4	11	8 3/4	2 3/4	2 1/8	...	1 1/4	3/8
1 1/4	6	1 1/8	...	4 3/4	9 1/2	3 3/4	12 1/2	9 3/4	2 3/4	2 3/8	...	1 1/2	3/8
1 1/2	6 3/4	1 1/4	...	5 1/2	11	4	14	10 3/4	3 1/4	2 7/8	...	1 5/8	3/8
2	7 3/4	1 3/8	...	6 1/4	12 1/2	4 1/4	15 1/2	12 1/4	3 3/4	3 1/8	...	2 1/4	3/8
2 1/2	8 1/2	1 1/2	1 1/4	6 3/4	13 1/2	4 3/4	17	13 1/4	3 3/4	3 3/8	...	2 3/4	3/8
3	9 1/2	1 5/8	1 3/8	7 1/4	14 1/2	5 1/4	18 1/2	14 1/4	4 1/4	4 1/8	...	3 1/4	3/8
3 1/2	10 3/4	1 7/8	1 1/2	8 1/4	16 1/2	5 3/4	20 1/2	16 1/4	4 1/4	4 3/8	...	3 3/4	3/8
4	11 1/2	2	1 5/8	8 3/4	17 1/2	6 1/4	22 1/2	17 1/4	5 1/4	5 1/8	...	4 1/4	3/8
4 1/2	13	2 1/8	1 3/4	9 3/4	19 1/2	6 3/4	25	19 1/4	5 3/4	5 3/8	...	4 3/4	3/8
5	13 1/2	2 1/4	1 7/8	10 3/4	21 1/2	7 1/4	27	20 3/4	6 1/4	5 7/8	...	5 1/4	3/8
6	15	2 3/8	2	11 3/4	23 1/2	7 3/4	28 1/2	22 1/4	6 3/4	6 1/8	...	5 3/4	3/8
7	16 1/2	2 1/2	2 1/8	12 3/4	25 1/2	8 1/4	31	24 1/4	7 1/4	6 3/4	...	6 3/4	3/8
8	18 1/2	2 3/4	2 3/8	14 1/4	28 1/2	8 3/4	34 1/2	27 1/4	7 3/4	7 1/8	...	7 3/8	3/8
9	20	2 7/8	2 1/2	15 1/4	30 1/2	9 1/4	37	29 1/4	8 1/4	8 1/8	...	8 3/4	3/8
10	21 1/2	3	2 5/8	16 1/4	32 1/2	9 3/4	39 1/2	31 1/4	8 3/4	8 3/8	...	9 3/4	3/8
12	24	3 1/8	2 3/4	17 1/4	34 1/2	10 3/4	43	34 1/4	8 3/4	9 1/8	...	11 3/4	3/8

The bore of these fittings is made to suit Extra Strong Pipe.

For drilling, see page 493.

For price list, see page 285.

These fittings are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face, if so ordered.

Dimensions of these Special Facings on application.

HYDRAULIC SCREWED FLANGES

1200 POUNDS HYDRAULIC AMERICAN STANDARD

SEMI-STEEL AND CAST STEEL

1200 Pounds Cold Water Working Pressure Hydrostatic (No Shock)

800 Pounds Cold Water Working Pressure—Shock

1200 Pounds Air or Gas Working Pressure—Temperature not Exceeding 100 deg. Fahr.

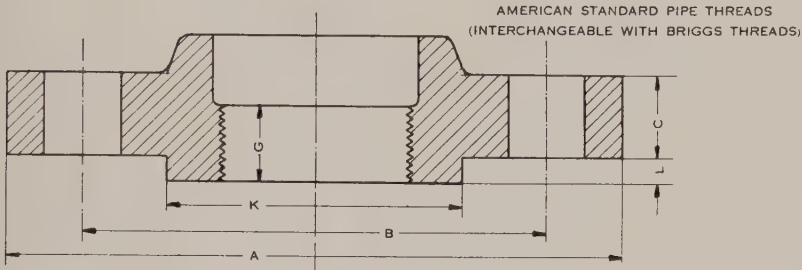


Fig. 6029

Size Inches	A	No. of Holes	Dia. of Holes	B	C Semi Steel	C Cast Steel	G	K	No. of Th'ds	L
3/4	4 3/4	4	5/8	3 3/8	7/8	...	9/16	1 1/16	14	3/16
1	5 1/2	4	3/4	4	1	...	11/16	2	11 1/2	3/16
1 1/4	6	4	3/4	4 3/8	1 1/8	...	11/16	2 1/2	11 1/2	3/16
1 1/2	6 3/4	4	7/8	4 7/8	1 1/4	...	3/4	2 7/8	11 1/2	3/16
2	7 3/4	8	7/8	5 7/8	1 3/8	1 1/8	3/4	3 5/8	11 1/2	3/16
2 1/2	8 1/2	8	1	6 1/2	1 1/2	1 1/4	1 1/8	4 1/8	8	3/16
3	9 1/2	8	1	7 1/2	1 5/8	1 3/8	1 3/16	5	8	3/16
3 1/2	10 3/4	8	1 1/8	8 1/2	1 7/8	1 1/2	1 1/4	5 1/2	8	3/16
4	11 1/2	8	1 1/8	9 1/4	2	1 5/8	1 5/16	6 3/16	8	3/16
4 1/2	13	8	1 1/4	10 1/2	2 1/8	1 3/4	1 3/8	6 3/4	8	3/16
5	13 1/2	8	1 1/4	11	2 1/4	1 7/8	1 3/8	7 5/16	8	3/16
6	15	12	1 1/4	12 1/2	2 3/8	2	1 1/2	8 1/2	8	3/16
7	16 1/2	12	1 3/8	13 3/4	2 1/2	2 1/8	1 5/8	9 5/8	8	1/4
8	18 1/2	12	1 1/2	15 1/2	2 3/4	2 3/8	1 11/16	10 5/8	8	1/4
9	20	16	1 1/2	17	2 7/8	2 1/2	1 13/16	11 5/8	8	1/4
10	21 1/2	16	1 1/2	18 1/2	3	2 5/8	1 15/16	12 3/4	8	1/4
12	24	20	1 1/2	21	3 1/8	2 3/4	2 1/8	15	8	1/4

For price list, see page 286.

Dimensions given for semi-steel or cast steel.

These flanges are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face, if so ordered.

STUART TWO PRESSURE HYDRAULIC

OPERATING VALVE. TYPE B

2000 POUNDS WORKING PRESSURE

HIGH PRESSURE - 2000 POUNDS

LOW PRESSURE - ANY PRESSURE ABOVE 125 POUNDS

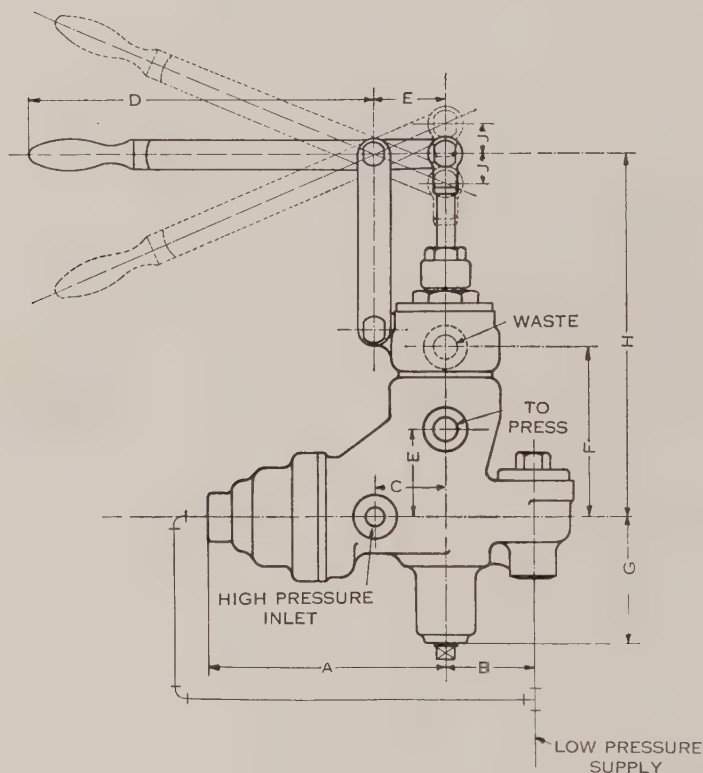


Fig. 731

Size Inches	A	B	C	D	E	F	G	H	J
$\bullet \frac{1}{2} \times \frac{3}{4} \times \frac{3}{4}$	$8\frac{3}{8}$	$3\frac{1}{16}$	$2\frac{7}{16}$	$12\frac{1}{4}$	$2\frac{1}{2}$	$5\frac{15}{16}$	$4\frac{7}{16}$	$12\frac{3}{4}$	$1\frac{1}{16}$
$\frac{3}{4} \times 1\frac{1}{2} \times 1\frac{1}{2}$	$8\frac{7}{8}$	$4\frac{1}{8}$	$2\frac{1}{2}$	$26\frac{1}{4}$	$3\frac{3}{4}$	$6\frac{3}{16}$	$5\frac{5}{8}$	$14\frac{15}{16}$	$1\frac{3}{8}$

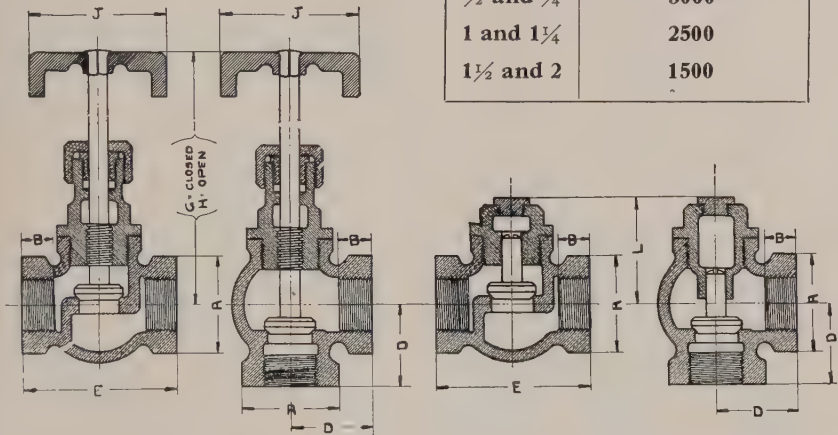
For description, see pages 289 and 290.

For installation diagram, see page 290.

For price list, see page 291.

HYDRAULIC BRONZE SCREWED GLOBE
ANGLE AND CHECK VALVES
1500 TO 3000 POUNDS WORKING PRESSURE

Size Inches	Working Pressure Pounds Per Square Inch
$\frac{1}{2}$ and $\frac{3}{4}$	3000
1 and $1\frac{1}{4}$	2500
$1\frac{1}{2}$ and 2	1500



Globe Valve
Fig. 667

Angle Valve
Fig. 668

Horizontal Lift
Check
Fig. 669

Angle Lift
Check
Fig. 670

Size.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	$1\frac{13}{16}$	$2\frac{1}{16}$	$2\frac{1}{4}$	$2\frac{1}{2}$	3	$3\frac{3}{8}$	$3\frac{7}{8}$
B	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
D	$1\frac{15}{16}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{7}{16}$	$2\frac{1}{2}$	3	$3\frac{1}{4}$
E	$3\frac{7}{8}$	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{7}{8}$	5	6	$6\frac{1}{2}$
G	$5\frac{9}{16}$	6	$6\frac{1}{8}$	$6\frac{1}{2}$	$7\frac{7}{16}$	$8\frac{11}{16}$	9
H	$5\frac{15}{16}$	$6\frac{3}{8}$	$6\frac{5}{8}$	$7\frac{1}{8}$	$7\frac{13}{16}$	$9\frac{7}{16}$	$9\frac{1}{2}$
J	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$	4	$4\frac{1}{4}$	$4\frac{3}{4}$
L	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{7}{8}$	4

For price list, see pages 292 and 293.

HYDRALUIC BRONZE SCREWED UNIONS
1500 TO 3000 POUNDS WORKING PRESSURE

Size Inches	Working Pressure Pounds per Square Inch
$\frac{1}{2}$ and $\frac{3}{4}$	3000
1 and $1\frac{1}{4}$	2500
$1\frac{1}{2}$ and 2	1500

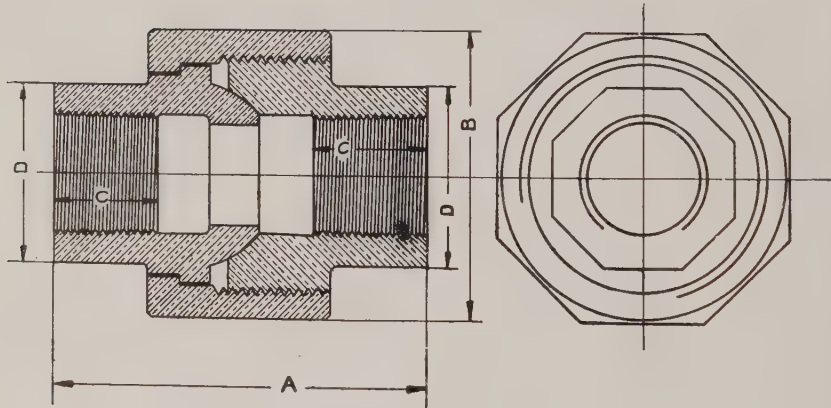


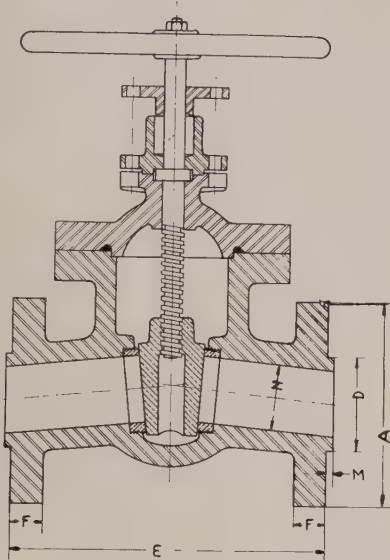
Fig. 671

Size.....inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	$2\frac{7}{8}$	$3\frac{7}{16}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$5\frac{1}{4}$	$5\frac{11}{16}$
B	$2\frac{5}{16}$	$2\frac{9}{16}$	3	$3\frac{5}{8}$	$4\frac{1}{8}$	$4\frac{3}{4}$
C	$\frac{5}{8}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
D	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{5}{8}$	$3\frac{1}{8}$

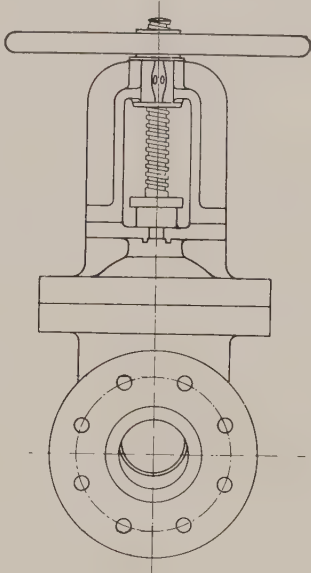
For price list, see page 293.

HYDRAULIC GATE VALVES—No. 7T
3000 POUNDS HYDRAULIC AMERICAN STANDARD
CAST STEEL—BRONZE MOUNTED

3000 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)
2000 Pounds Cold Water Working Pressure—Shock
3000 Pounds Air or Gas Working Pressure—Temperature not Exceeding
100 deg. Fahr.



Inside Screw Valve
Fig. 721



Outside Screw and Yoke Valve
Fig. 722

Size Inches	A	D	E	F	N	M
1½	6¾	1½	11	1¼	1¼	3/16
2	7¾	2¾	12½	1¾	1½	3/16
2½	8½	2¾	13½	1½	1¾	3/16
3	9½	3½	14½	1¾	2¼	3/16
3½	10¾	4	16½	1¾	2¾	3/16
4	11½	4½	17½	2	3¼	3/16
4½	13	5	19½	2½	3¾	3/16
5	13½	5¾	21½	2¼	4¼	3/16
6	15	6¾	23½	2¾	4¾	3/16
7	16½	7¾	25½	2½	5¾	1/4
8	18½	8¾	28½	2¾	6¾	1/4
9	20	9¾	30½	2¾	7¾	1/4
10	21½	10¾	32½	3	8¾	1/4
12	24	12¾	37	3½	10¾	1/4

The bore of these valves is made to suit XX strong pipe.
For drilling, see page 500. For price list, see page 295.
These valves are regularly furnished with raised face but, can be furnished with Male and Female or Tongue and Groove face if so ordered.
Dimensions of Special Facings on application.

HYDRAULIC FLANGED SWING CHECK VALVES

3000 POUNDS HYDRAULIC AMERICAN STANDARD CAST STEEL BRONZE MOUNTED

3000 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)

2000 Pounds—Cold Water Working Pressure—Shock

3000 Pounds—Air or Gas Working Pressure—Temperature not Exceeding
100 Deg. Fahr.

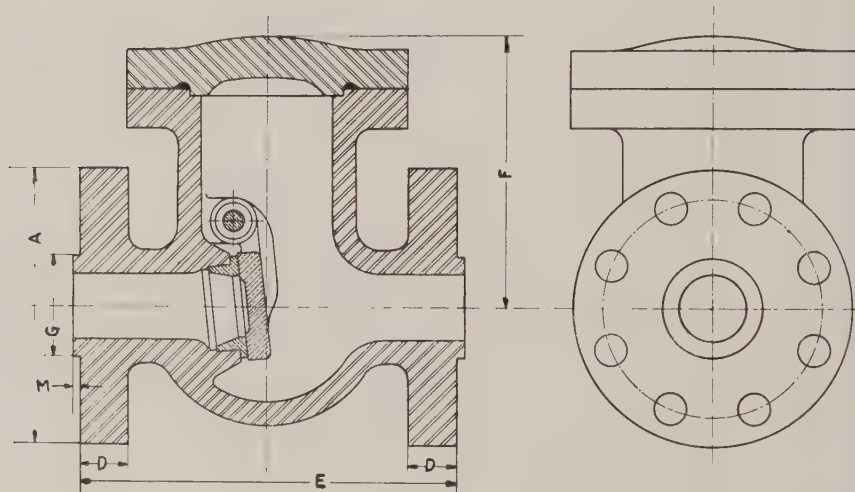


Fig. 723

Size Inches	2½	3	4	5	6
A	8½	9½	11½	13½	15
D	1½	1⅝	2	2¼	2⅜
E	11½	13½	15½	18¾	19½
F	8¾	9¼	10¾	12¾	14¼
G	2⅞	3½	4½	5⅞	6⅝
M	⅜	⅜	⅜	⅜	⅜

The bore of these valves is made to suit XX strong pipe.

For drilling, see page 500.

For price list, see page 296.

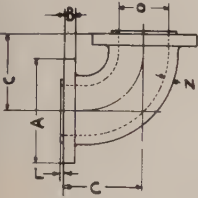
These valves are regularly furnished with raised face but can be furnished with Male and Female or Tongue and Groove, if so ordered.

Dimensions of Special Facings on application.

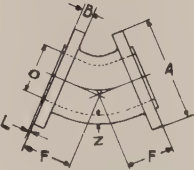
HYDRAULIC FLANGED FITTINGS—CAST STEEL

3000 POUNDS HYDRAULIC AMERICAN STANDARD

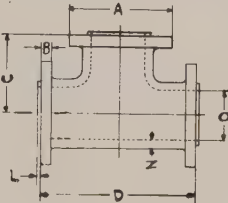
3000 Pounds—Cold Water Working Pressure—Hydrostatic (No Shock)
2000 Pounds—Cold Water Working Pressure—Shock
3000 Pounds—Air or Gas Working Pressure—Temperature Not Exceeding 100 deg. Fahr.



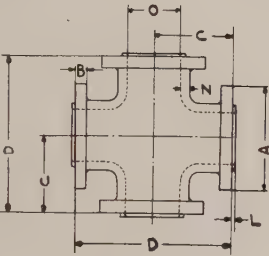
Std. Elbow
Fig. 724



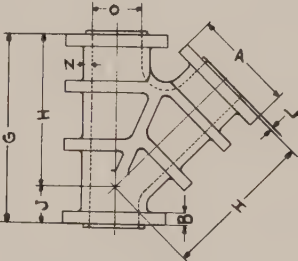
45° Elbow
Fig. 725



Tee
Fig. 726



Cross
Fig. 727



Lateral
Fig. 728

Size Inches	A	B	C	D	F	G	H	J	N	O	L
1/2	4 1/4	3/4	3 1/4	6 1/2	2 1/4	8 1/2	6 3/4	1 3/4	7/16	3/8	3/16
3/4	4 3/4	7/8	3 3/4	7 1/2	2 3/4	10	7 3/4	2 1/4	1 1/2	1/2	3/16
1	5 1/2	1	4 1/4	8 1/2	3 1/4	11	8 3/4	2 1/4	1 1/2	3/4	3/16
1 1/4	6	1 1/8	4 3/4	9 1/2	3 3/4	12 1/2	9 3/4	2 3/4	9/16	15/16	3/16
1 1/2	6 3/4	1 1/4	5 1/4	11	4	14	10 3/4	3 1/4	1 1/2	1 1/4	3/16
2	7 3/4	1 3/8	6 1/4	12 1/2	4 1/4	15 1/2	12 1/4	3 1/4	5/8	1 1/2	3/16
2 1/2	8 1/2	1 1/2	6 3/4	13 1/2	4 3/4	17	13 1/4	3 3/4	3/4	1 7/8	3/16
3	9 1/2	1 5/8	7 1/4	14 1/2	5 1/4	18 1/2	14 1/4	4 1/4	7/8	2 1/4	3/16
3 1/2	10 3/4	1 7/8	8 1/4	16 1/2	5 3/4	20 1/2	16 1/4	4 1/4	1	2 3/4	3/16
4	11 1/2	2	8 3/4	17 1/2	6 1/4	22 1/2	17 1/4	5 1/4	1 1/8	3 1/4	3/16
4 1/2	13	2 1/8	9 3/4	19 1/2	6 3/4	25	19 1/4	5 3/4	1 1/8	3 3/4	3/16
5	13 1/2	2 1/4	10 3/4	21 1/2	7 1/4	27	20 3/4	6 1/4	1 1/2	4 1/4	3/16
6	15	2 3/8	11 3/4	23 1/2	7 3/4	29	22 1/4	6 1/4	1 5/8	4 3/4	3/16
7	16 1/2	2 1/2	12 3/4	25 1/2	8 1/4	31	24 1/4	6 3/4	1 3/4	5 3/4	1/4
8	18 1/2	2 3/4	14 3/4	28 1/2	8 3/4	34 1/2	27 1/4	7 1/4	1 7/8	6 3/4	1/4
9	20	2 7/8	15 1/4	30 1/2	9 1/4	37	29 1/4	7 3/4	2	7 5/8	1/4
10	21 1/2	3	16 1/4	32 1/2	9 3/4	39 1/2	31 1/4	8 1/4	2 1/8	8 3/4	1/4
12	24	3 1/8	17 1/4	34 1/2	10 3/4	43	34 1/4	8 3/4	2 3/8	10 3/4	1/4

The bore of these fittings is made to suit XX Strong Pipe.
For drilling, see page 500.
For price list, see page 297.
These fittings are regularly furnished with a raised face, but can be furnished with Male and Female or Tongue and Groove face, if so desired.
Dimensions of Special Facings on application.

HYDRAULIC SCREWED FLANGES
CAST STEEL

3000 POUNDS HYDRAULIC AMERICAN STANDARD

3000 Pounds Cold Water Working Pressure—Hydrostatic (No Shock)

2000 Pounds Cold Water Working Pressure—Shock

3000 Pounds Air or Gas Working Pressure—Temperature not Exceeding
100 deg. Fahr.

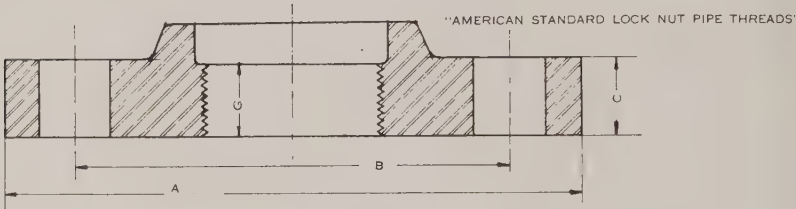


Fig. 729

Size Inches	A	No. of Holes	Dia. of Holes	B	C	G	No. of Th'ds.
$\frac{3}{4}$	$4\frac{3}{4}$	4	$\frac{3}{4}$	$3\frac{3}{8}$	$\frac{7}{8}$	$\frac{9}{16}$	14
1	$5\frac{1}{2}$	4	$\frac{3}{4}$	4	1	$\frac{11}{16}$	$11\frac{1}{2}$
$1\frac{1}{4}$	6	4	$\frac{7}{8}$	$4\frac{3}{8}$	$1\frac{1}{8}$	$\frac{11}{16}$	$11\frac{1}{2}$
$1\frac{1}{2}$	$6\frac{3}{4}$	4	1	$4\frac{7}{8}$	$1\frac{1}{4}$	$\frac{3}{4}$	$11\frac{1}{2}$
2	$7\frac{3}{4}$	8	1	$5\frac{7}{8}$	$1\frac{3}{8}$	$\frac{3}{4}$	$11\frac{1}{2}$
$2\frac{1}{2}$	$8\frac{1}{2}$	8	1	$6\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{8}$	8
3	$9\frac{1}{2}$	8	$1\frac{1}{8}$	$7\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{16}$	8
$3\frac{1}{2}$	$10\frac{3}{4}$	8	$1\frac{1}{8}$	$8\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{4}$	8
4	$11\frac{1}{2}$	8	$1\frac{1}{4}$	$9\frac{1}{4}$	2	$1\frac{5}{16}$	8
$4\frac{1}{2}$	13	8	$1\frac{3}{8}$	$10\frac{1}{2}$	$2\frac{1}{8}$	$1\frac{3}{8}$	8
5	$13\frac{1}{2}$	8	$1\frac{3}{8}$	11	$2\frac{1}{4}$	$1\frac{3}{8}$	8
6	15	12	$1\frac{3}{8}$	$12\frac{1}{2}$	$2\frac{3}{8}$	$1\frac{1}{2}$	8
7	$16\frac{1}{2}$	12	$1\frac{1}{2}$	$13\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{5}{8}$	8
8	$18\frac{1}{2}$	12	$1\frac{5}{8}$	$15\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{11}{16}$	8
9	20	16	$1\frac{5}{8}$	17	$2\frac{7}{8}$	$1\frac{13}{16}$	8
10	$21\frac{1}{2}$	16	$1\frac{5}{8}$	$18\frac{1}{2}$	3	$1\frac{15}{16}$	8
12	24	20	$1\frac{5}{8}$	21	$3\frac{1}{8}$	$2\frac{1}{8}$	8

For price list, see page 298.

These flanges are regularly furnished with plain face, but can be furnished with Male and Female or Tongue and Groove face, if so ordered.

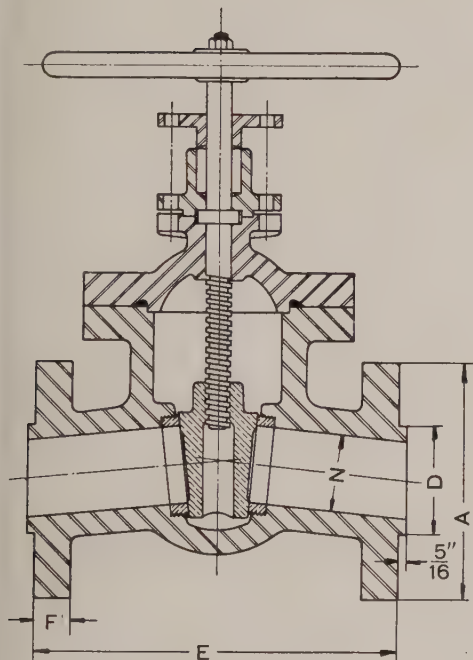
Dimensions of Special Facings on application.

HYDRAULIC CAST STEEL GATE VALVES No. 8 T

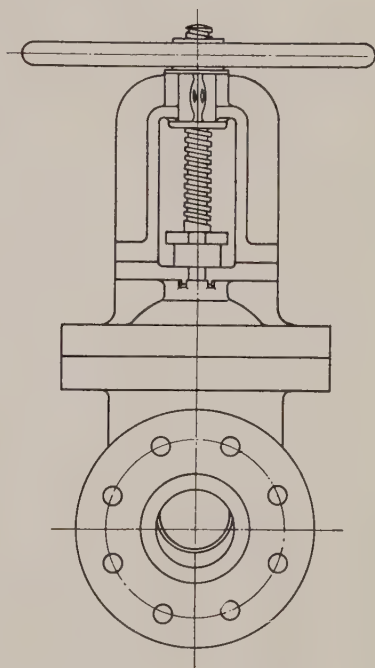
3000 POUNDS PITTSBURGH STANDARD

BRONZE MOUNTED

3000 POUNDS WORKING PRESSURE—SHOCK



**Inside Screw Valve
Fig. 835**



**Outside Screw and Yoke Valve
Fig. 836**

Size Inches	A	D	E	F	N	Size Inches	A	D	E	F	N
1½	7¼	2¼	12	1⅜	1¼	4	11¾	5	19	2	3⅛
2	8¼	2¾	13½	1½	1½	5	14¾	6⅛	23	2⅜	4⅛
2½	8¾	3¼	15	1⅝	1¾	6	16¼	7¼	25	2½	5⅛
3	9½	3⅞	16½	1¾	2⅝	8	19½	9¼	32	2¾	7

¾-inch and 1-inch valves are made bronze.

The bore of these valves is made to suit XX strong pipe.

For drilling, see page 505.

For price list, see page 302.

HYDRAULIC CAST STEEL FLANGED ELBOWS

3000 POUNDS PITTSBURGH STANDARD
3000 POUNDS WORKING PRESSURE—SHOCK

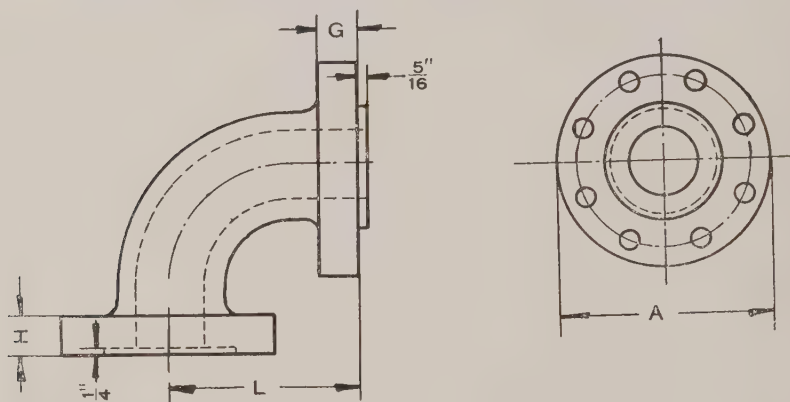


Fig. 837
"I" = Inside diameter of elbow

Size Inches	A	G	H	I	L
$\frac{3}{4}$	$5\frac{1}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$	$\frac{9}{16}$	$5\frac{1}{4}$
1	$5\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$\frac{9}{16}$	$5\frac{1}{4}$
$1\frac{1}{4}$	$6\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{7}{8}$	$5\frac{3}{4}$
$1\frac{1}{2}$	$7\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{1}{8}$	$6\frac{1}{2}$
2	$8\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$	7
$2\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{5}{8}$	$1\frac{7}{8}$	$1\frac{3}{4}$	$7\frac{1}{2}$
3	$9\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	8
$3\frac{1}{2}$	$10\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{8}$	$2\frac{3}{4}$	9
4	$11\frac{3}{4}$	2	$2\frac{1}{4}$	$3\frac{1}{8}$	$9\frac{3}{4}$
5	$14\frac{3}{4}$	$2\frac{3}{8}$	$2\frac{5}{8}$	$4\frac{1}{8}$	$11\frac{1}{2}$
6	$16\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$5\frac{1}{8}$	$13\frac{1}{4}$
8	$19\frac{1}{2}$	$2\frac{3}{4}$	3	$6\frac{7}{8}$	$16\frac{1}{2}$

The bore of these elbows is made to suit XX strong pipe.
For drilling, see page 535.
For price list, see page 303.

HYDRAULIC CAST STEEL FLANGED
TEES

3000 POUNDS PITTSBURGH STANDARD
3000 POUNDS WORKING PRESSURE—SHOCK

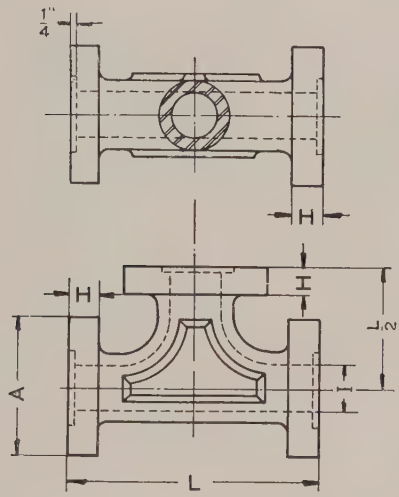


Fig. 838

Size Inches	A	H	I	L
3/4	5 1/4	1 1/8	9/16	11
1	5 1/4	1 3/8	9/16	11
1 1/4	6 1/4	1 1/2	7/8	13
1 1/2	7 1/4	1 5/8	1 1/8	14
2	8 1/4	1 3/4	1 1/2	15
2 1/2	8 3/4	1 7/8	1 3/4	16
3	9 1/2	2	2 1/4	17
3 1/2	10 3/4	2 1/8	2 3/4	18
4	11 3/4	2 1/4	3 1/8	19
5	14 3/4	2 5/8	4 1/8	23
6	16 1/4	2 3/4	5 1/8	25
8	19 1/2	3	6 7/8	29

The bore of these tees is made to suit XX strong pipe.
For drilling, see page 505.
For price list, see page 303.

HYDRAULIC BRONZE SCREWED ELBOWS AND TEES

3000 POUNDS WORKING PRESSURE—SHOCK

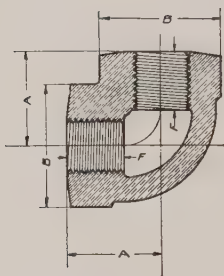


Fig. 826
90° Elbows

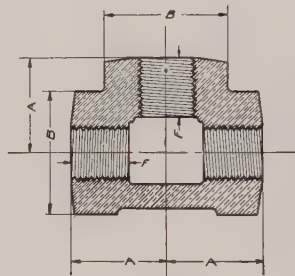


Fig. 825
Tees

Elbows				Tees			
Size Inches	A	B	F	Size Inches	A	B	F
$\frac{1}{4}$	$1\frac{1}{16}$	$1\frac{3}{16}$	$\frac{11}{16}$	$\frac{1}{4}$	$1\frac{1}{16}$	$1\frac{3}{16}$	$\frac{11}{16}$
$\frac{3}{8}$	$1\frac{3}{16}$	$1\frac{7}{16}$	$\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{16}$	$1\frac{7}{16}$	$\frac{3}{4}$
$\frac{1}{2}$	$1\frac{7}{16}$	$1\frac{7}{8}$	$\frac{7}{8}$	$\frac{1}{2}$	$1\frac{7}{16}$	$1\frac{7}{8}$	$\frac{7}{8}$
$\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{1}{4}$	1	$\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{1}{4}$	1
1	2	$2\frac{5}{8}$	$1\frac{1}{8}$	1	2	$2\frac{5}{8}$	$1\frac{1}{8}$
$1\frac{1}{4}$	$2\frac{1}{4}$	$3\frac{3}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$2\frac{1}{4}$	$3\frac{3}{8}$	$1\frac{1}{4}$
$1\frac{1}{2}$	$2\frac{7}{16}$	$3\frac{3}{16}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$2\frac{7}{16}$	$3\frac{3}{16}$	$1\frac{3}{8}$
2	$2\frac{3}{4}$	$4\frac{11}{16}$	$1\frac{1}{2}$	2	$2\frac{3}{4}$	$4\frac{11}{16}$	$1\frac{1}{2}$

For price list, see page 304.

HYDRAULIC CAST STEEL FLANGES

3000 POUNDS PITTSBURGH STANDARD

3000 POUNDS WORKING PRESSURE—SHOCK

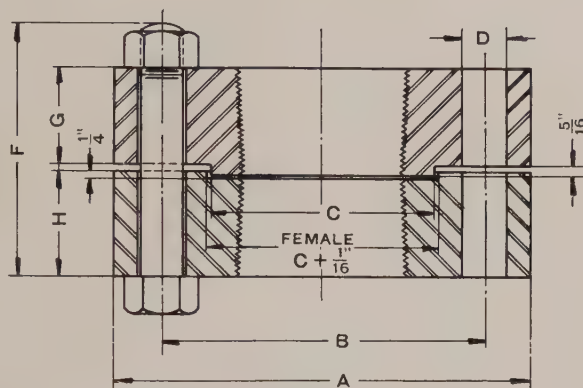


Fig. 839

Size Inches	A	B	No. Holes	D	C	G	H	Dia. Bolts	F
3/4	5 1/4	3 1/2	4	7/8	1 3/8	1 1/4	1 1/2	3/4	3 3/4
1	5 1/4	3 1/2	4	7/8	1 5/8	1 1/2	1 3/4	3/4	4 1/4
1 1/4	6 1/4	4 1/4	4	1	2	1 5/8	1 7/8	7/8	4 3/4
1 1/2	7 1/4	5	4	1 1/8	2 1/4	1 7/8	2 1/8	1	5 1/4
2	8 1/4	5 3/4	4	1 1/4	2 3/4	2 1/8	2 3/8	1 1/8	6
2 1/2	8 3/4	6 3/4	8	1	3 1/4	2 3/8	2 5/8	7/8	6 1/4
3	9 1/2	7 1/4	8	1 1/8	3 7/8	2 1/2	2 3/4	1	6 1/2
3 1/2	10 3/4	8 1/4	8	1 1/4	4 1/2	2 9/16	2 5/16	1 1/8	6 3/4
4	11 3/4	9	8	1 3/8	5	2 5/8	2 7/8	1 1/4	7
5	14 3/4	11	8	1 5/8	6 1/8	2 3/4	3	1 1/2	7 1/2
6	16 1/4	12 1/2	8	1 7/8	7 1/4	2 7/8	3 1/8	1 3/4	8
8	19 1/2	15 3/4	12	1 7/8	9 1/4	3 1/8	3 3/8	1 3/4	8 1/2

For prices, see page 305.

CHECK VALVE FOR EXTREME HYDRAULIC PRESSURES

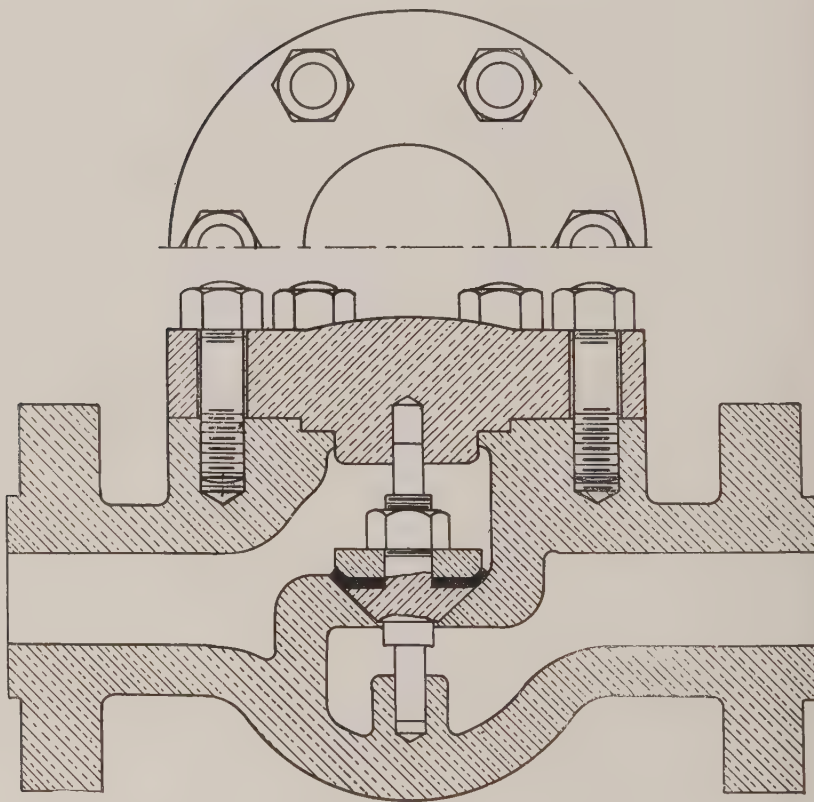


Fig. 9006

These check valves are very durable and remain absolutely tight for long periods under very high pressures. Bodies are solid bronze and the packing washer in the disc is a leather ring, and therefore readily renewable. Upon receipt of information as to pressure and service we will quote prices promptly.

FLANGED JOINT FOR EXTREME HYDRAULIC PRESSURES

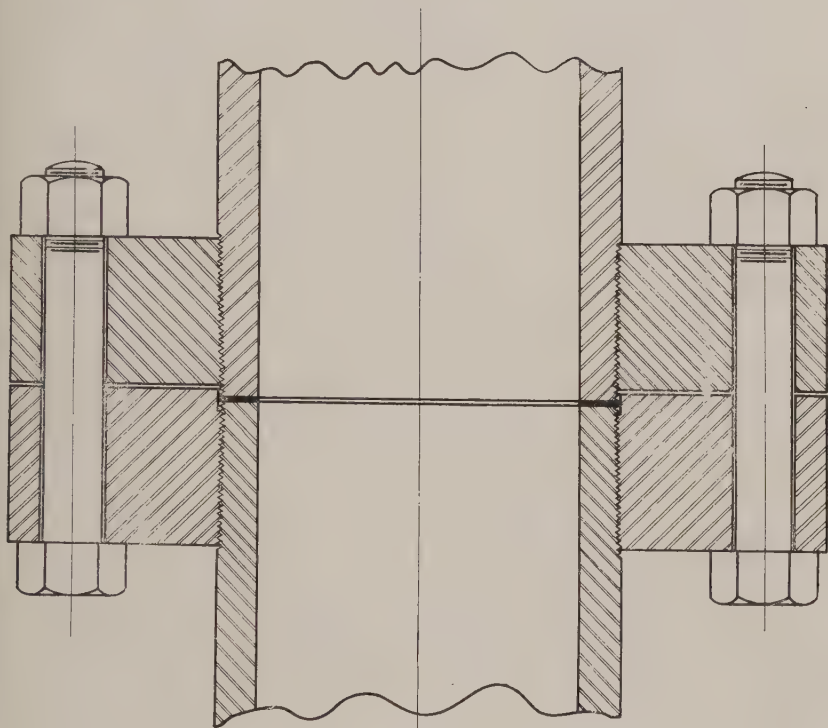
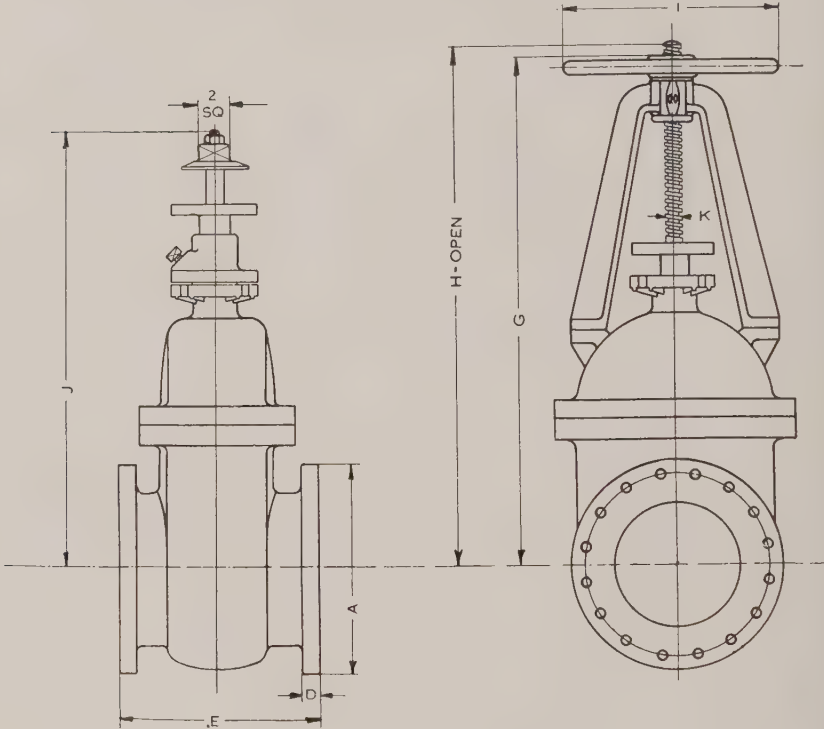


Fig. 9007

This type of joint can be used where the pipe is Double Extra Strong, or thicker, so as to give sufficient bearing for the gasket on the end of the pipe itself. For extreme pressures this joint with annealed copper gaskets will be found ample to meet any requirements.

FLANGED GAS LINE GATE VALVES No. 4 P
SEMI STEEL. BRONZE MOUNTED. PARALLEL SEAT.
400 POUNDS WORKING GAS PRESSURE



Inside Screw Valve

Fig. 4246

Outside Screw and Yoke Valve

Fig. 4035

O=Number of turns to open.

Size Inches	3	4	5	6	8	10	12	14	16	18	20
A	8¼	10	11	12½	15	17½	20	22½	25	27	29½
D	1⅞	1¼	1⅜	1⅞	1⅞	1⅞	2	2⅞	2¼	2⅜	2½
E	9¾	12	13	14	16½	18	19¾	20	20½	22	24
G	18⅞	23⅞	26½	28¾	36¾	41¼	48⅞	54¼	60⅞	68¾	75
H	22¼	28¾	34¼	36⅝	47	53½	62½	70¼	78¾	89	97⅞
J	17¼	21¼	23½	26¼	30	33½	39	42¼	48¼	54	57
I	9	12	15	15	18	18	21	21	27	32	32
K	1	1⅞	1¼	1¼	1½	1½	1¾	1¾	2	2¼	2¼

For drilling, see page 513, with note.

For description, see page 312.

For price list, see page 314.

Inside screw. Valves furnished with square for wrench unless otherwise ordered.

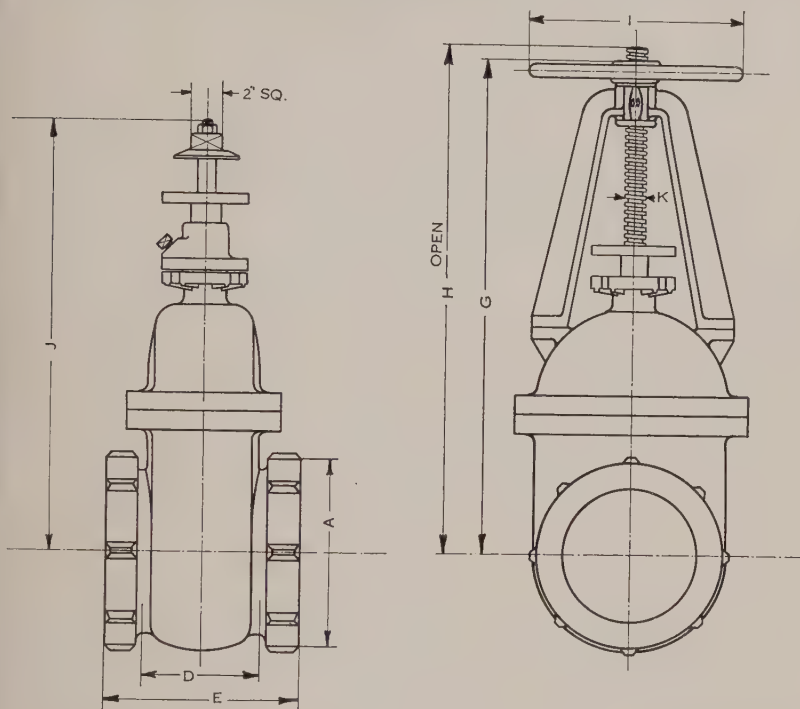
Outside screw and yoke valves furnished with hand wheel.

SCREWED GAS LINE GATE VALVES

No. 4 P

SEMI-STEEL. BRONZE MOUNTED. PARALLEL SEAT.

400 POUNDS WORKING GAS PRESSURE



D-LAYING LENGTH OF VALVE.

Inside Screw Valve
Fig. 4247

Outside Screw and Yoke Valve
Fig. 4037

"O" = Number of turns to open

Size.....inches	3	4	6	8	10	12
A	5 $\frac{3}{4}$	7	9	11 $\frac{1}{2}$	15 $\frac{1}{2}$	17 $\frac{3}{4}$
D	5	7	9	10 $\frac{1}{2}$	11 $\frac{1}{2}$	12
E	10 $\frac{1}{2}$	12	15	16 $\frac{3}{4}$	18	19
G	18 $\frac{1}{8}$	23 $\frac{3}{8}$	28 $\frac{3}{4}$	36 $\frac{3}{4}$	41 $\frac{1}{4}$	48 $\frac{3}{8}$
H	22 $\frac{1}{4}$	28 $\frac{3}{4}$	36 $\frac{5}{8}$	47	53 $\frac{1}{2}$	62 $\frac{1}{2}$
I	9	12	15	18	18	21
J	17 $\frac{1}{4}$	21 $\frac{1}{4}$	26 $\frac{1}{4}$	30	33 $\frac{1}{2}$	39
K	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$
O	14	18	14	18	22	26

Furnished with hand wheel or square for wrench as desired.

For description, see page 312.

For price list, see page 314.

Inside screw valves furnished with square for wrench unless otherwise ordered.

Outside screw and yoke valves furnished with hand wheel.

GAS LINE CHECK VALVES

SEMI-STEEL. BRONZE MOUNTED. SWING TYPE.

400 POUNDS WORKING GAS PRESSURE

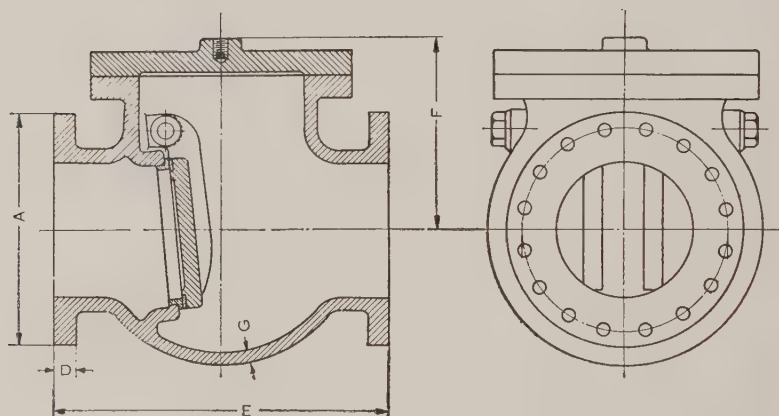


Fig. 4248

Size.....in.	2	2½	3	4	5	6	7	8	10	12	14	15	16	18	20
A	6½	7½	8¼	10	11	12½	14	15	17½	20	22½	23½	25	27	29½
D	7/8	1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1⅞	2	2⅛	2⅜	2¼	2⅝	2½
E	9	10½	11	13	14½	17	20	21	25	27	30	32	34½	37	43
F	5⅞	7	7⅞	8⅞	9⅞	10⅞	11⅞	12⅞	13⅞	16⅞	18	18½	18⅞	20¼	23
G	½	½	9/16	5/8	¾	13/16	7/8	1	1	1⅛	1⅛	1⅜	1¼	1⅝	1½

For drilling, see page 513, with note.

For price list, see page 315.

GAS LINE BOWL AND FLANGE PIECES

SEMI-STEEL

400 POUNDS WORKING GAS PRESSURE

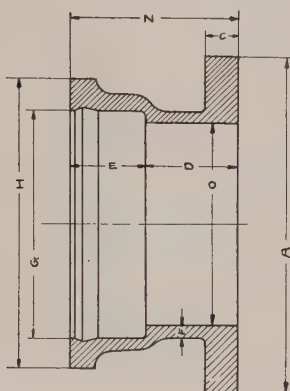


Fig. 4038

Size Inches	A	C	D	E	F	G	H	N	O
3	8 $\frac{1}{4}$	1 $\frac{1}{8}$	4	3	1 $\frac{1}{2}$	4 $\frac{1}{4}$	7 $\frac{1}{8}$	7	3
4	10	1 $\frac{1}{4}$	4 $\frac{1}{2}$	3	1 $\frac{1}{2}$	5 $\frac{1}{4}$	8 $\frac{1}{8}$	7 $\frac{1}{2}$	4
5	11	1 $\frac{3}{8}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$	1 $\frac{9}{16}$	6 $\frac{5}{16}$	9 $\frac{5}{16}$	8	5
6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$	1 $\frac{5}{8}$	7 $\frac{3}{8}$	10 $\frac{1}{2}$	8	6
7	14	1 $\frac{1}{2}$	5	3 $\frac{1}{2}$	1 $\frac{5}{8}$	8 $\frac{3}{8}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	7
8	15	1 $\frac{5}{8}$	5	4	1 $\frac{5}{8}$	9 $\frac{3}{8}$	12 $\frac{5}{8}$	9	8
9	16	1 $\frac{3}{4}$	5	4	1 $\frac{5}{8}$	10 $\frac{3}{8}$	13 $\frac{5}{8}$	9	9
10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	5	4	1 $\frac{11}{16}$	11 $\frac{1}{2}$	15 $\frac{1}{8}$	9	10
12	20	2	5 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{3}{4}$	13 $\frac{1}{2}$	17 $\frac{1}{4}$	10	12
14	22 $\frac{1}{2}$	2 $\frac{1}{8}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{13}{16}$	14 $\frac{3}{4}$	18 $\frac{3}{4}$	10	13 $\frac{3}{8}$
15	23 $\frac{1}{2}$	2 $\frac{3}{16}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{13}{16}$	15 $\frac{3}{4}$	19 $\frac{3}{4}$	10	14 $\frac{3}{8}$
16	25	2 $\frac{1}{4}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{7}{8}$	16 $\frac{3}{4}$	20 $\frac{7}{8}$	10	15 $\frac{1}{4}$
18	27	2 $\frac{3}{8}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{7}{8}$	18 $\frac{7}{8}$	23 $\frac{1}{8}$	10	17 $\frac{1}{4}$
20	29 $\frac{1}{2}$	2 $\frac{1}{2}$	6	4 $\frac{1}{2}$	1 $\frac{15}{16}$	20 $\frac{7}{8}$	25 $\frac{1}{4}$	10 $\frac{1}{2}$	19 $\frac{1}{4}$

For drilling, see page 513, with note.

For price list, see page 316.

SCREWED GAS LINE ELBOWS, TEES
AND 45 DEGREE Y'S

SEMI-STEEL. LEAD RECESS.

400 POUNDS WORKING GAS PRESSURE

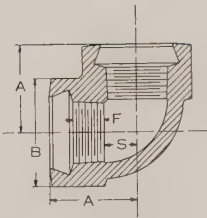


Fig. 4040
90° Elbows

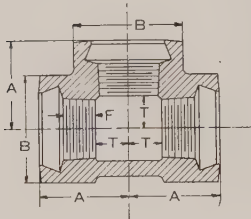


Fig. 4041
Tees

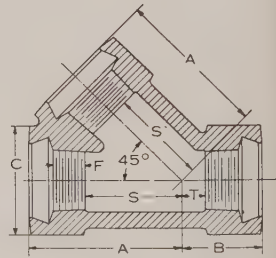


Fig. 4042
45° Y's

Size Inches	A	B	F	S	Size Inches	A	B	F	T	Size Inches	A	B	C	F	S	T
2	3 ³ / ₈	4	1 ¹ / ₄	1 ¹ / ₄	2	3 ³ / ₈	4	1 ¹ / ₄	1 ¹ / ₄	3	8 ¹ / ₈	3 ¹ / ₂	5 ⁵ / ₁₆	1 ⁹ / ₁₆	5 ¹¹ / ₁₆	1 ¹ / ₁₆
3	4 ¹ / ₂	5 ⁵ / ₁₆	1 ⁹ / ₁₆	2 ¹ / ₁₆	3	4 ¹ / ₂	5 ⁵ / ₁₆	1 ⁹ / ₁₆	2 ¹ / ₁₆	4	9 ¹¹ / ₁₆	3 ¹⁵ / ₁₆	6 ³ / ₄	1 ¹¹ / ₁₆	7 ¹ / ₁₆	1 ⁵ / ₁₆
4	5 ¹ / ₄	6 ³ / ₄	1 ¹¹ / ₁₆	2 ⁵ / ₈	4	5 ¹ / ₄	6 ³ / ₄	1 ¹¹ / ₁₆	2 ⁵ / ₈	6	12 ³ / ₄	4 ⁷ / ₈	9 ¹ / ₄	1 ⁷ / ₈	9 ⁷ / ₈	2
6	6 ⁹ / ₁₆	9 ¹ / ₄	1 ⁷ / ₈	3 ¹¹ / ₁₆	6	6 ⁹ / ₁₆	9 ¹ / ₄	1 ⁷ / ₈	3 ¹¹ / ₁₆	8	15 ³ / ₄	5 ¹ / ₂	11 ¹ / ₂	2 ¹ / ₈	12 ⁵ / ₈	2 ³ / ₈
8	7 ¹⁵ / ₁₆	11 ¹ / ₂	2 ¹ / ₈	4 ¹³ / ₁₆	8	7 ¹⁵ / ₁₆	11 ¹ / ₂	2 ¹ / ₈	4 ¹³ / ₁₆	10	18 ³ / ₄	6 ³ / ₈	13 ⁵ / ₈	2 ⁵ / ₁₆	15 ³ / ₁₆	2 ⁹ / ₁₆
10	10	13 ⁵ / ₈	2 ⁵ / ₁₆	6 ⁷ / ₁₆	10	10	13 ⁵ / ₈	2 ⁵ / ₁₆	6 ⁷ / ₁₆	12	21 ³ / ₄	7 ¹ / ₈	16 ³ / ₈	2 ¹ / ₂	18	3 ³ / ₈
12	11 ¹ / ₈	16 ³ / ₈	2 ¹ / ₂	7 ³ / ₈	12	11 ¹ / ₈	16 ³ / ₈	2 ¹ / ₂	7 ³ / ₈							

For price list, see page 317.

LEAD RECESSED GAS LINE SCREWED
FLANGES

SEMI-STEEL

400 POUNDS WORKING GAS PRESSURE

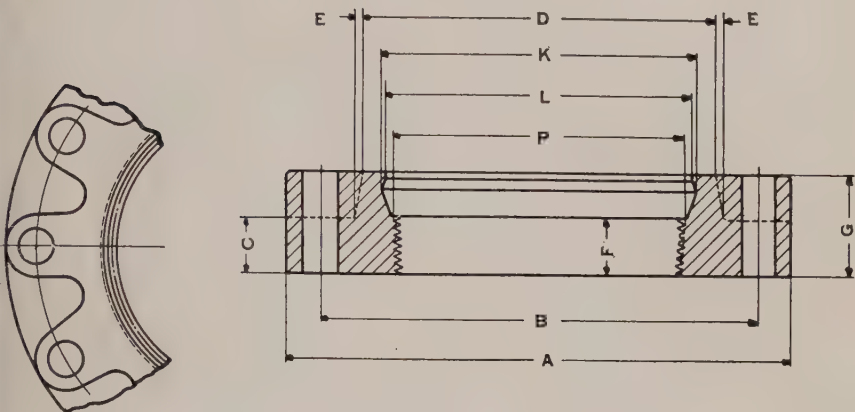


Fig. 4234

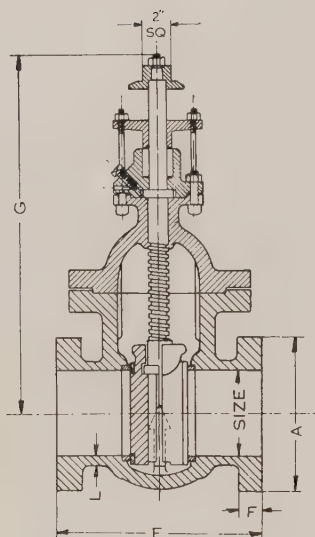
Size Inches	Number of Holes	Diam- eter of Holes	A	B	C	D	E	F	G	K	L	P
2	4	$\frac{3}{4}$	$6\frac{1}{2}$	5	$\frac{7}{8}$	$3\frac{3}{4}$	$\frac{1}{16}$	$\frac{3}{4}$	$2\frac{1}{16}$	3	$2\frac{3}{4}$	$2\frac{3}{8}$
3	8	$\frac{3}{4}$	$8\frac{1}{4}$	$6\frac{5}{8}$	$1\frac{1}{8}$	$5\frac{1}{8}$	$\frac{1}{8}$	$1\frac{3}{16}$	$2\frac{5}{16}$	$4\frac{1}{8}$	$3\frac{7}{8}$	$3\frac{1}{2}$
4	8	$\frac{7}{8}$	10	$7\frac{7}{8}$	$1\frac{1}{4}$	6	$\frac{1}{8}$	$1\frac{5}{16}$	$2\frac{7}{16}$	$5\frac{1}{8}$	$4\frac{7}{8}$	$4\frac{1}{2}$
5	8	$\frac{7}{8}$	11	$9\frac{1}{4}$	$1\frac{3}{8}$	$7\frac{1}{8}$	$\frac{1}{8}$	$1\frac{3}{8}$	$2\frac{9}{16}$	$6\frac{3}{16}$	$5\frac{15}{16}$	$5\frac{5}{16}$
6	12	$\frac{7}{8}$	$12\frac{1}{2}$	$10\frac{5}{8}$	$1\frac{7}{16}$	$8\frac{1}{2}$	$\frac{1}{8}$	$1\frac{1}{2}$	$2\frac{9}{16}$	$7\frac{3}{8}$	$7\frac{1}{8}$	$6\frac{5}{8}$
8	12	1	15	13	$1\frac{5}{8}$	$10\frac{1}{2}$	$\frac{3}{16}$	$1\frac{11}{16}$	3	$9\frac{3}{8}$	$9\frac{1}{8}$	$8\frac{5}{8}$
10	16	1	$17\frac{1}{2}$	$15\frac{1}{4}$	$1\frac{7}{8}$	$12\frac{3}{4}$	$\frac{3}{16}$	$1\frac{15}{16}$	$3\frac{1}{4}$	$11\frac{1}{2}$	$11\frac{1}{4}$	$10\frac{3}{4}$
12	16	1	20	$17\frac{3}{4}$	2	15	$\frac{1}{4}$	$2\frac{1}{8}$	$3\frac{5}{8}$	$13\frac{5}{8}$	$13\frac{1}{4}$	$12\frac{3}{4}$
14	20	1	$22\frac{1}{2}$	20	$2\frac{1}{8}$	$19\frac{1}{4}$	$\frac{1}{4}$	$2\frac{1}{4}$	$3\frac{3}{4}$	$14\frac{7}{8}$	$14\frac{1}{2}$	14
16	20	$1\frac{1}{8}$	25	$22\frac{1}{2}$	$2\frac{1}{4}$	$20\frac{1}{2}$	$\frac{1}{4}$	$2\frac{7}{16}$	$3\frac{5}{16}$	$16\frac{7}{8}$	$16\frac{1}{2}$	16
18	24	$1\frac{1}{8}$	27	$24\frac{1}{2}$	$2\frac{3}{8}$	$23\frac{5}{8}$	$\frac{1}{4}$	$2\frac{5}{8}$	$4\frac{1}{8}$	$18\frac{7}{8}$	$18\frac{1}{2}$	18
20	24	$1\frac{1}{4}$	$29\frac{1}{2}$	$26\frac{3}{4}$	$2\frac{1}{2}$	$24\frac{1}{4}$	$\frac{1}{4}$	$2\frac{7}{8}$	$4\frac{5}{16}$	$20\frac{7}{8}$	$20\frac{1}{2}$	20

For price list, see page 318.

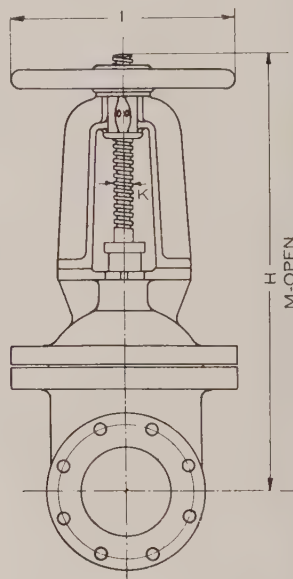
NOTE.—The drilling as shown above is standard with many large Gas Companies. The same does not conform to the American Standard. Material with the American Standard drilling can be furnished if so ordered.

See page 461 for American Standard Drilling.

GAS LINE GATE VALVES No. 5 P
SEMI-STEEL. PARALLEL SEAT. BRONZE MOUNTED.
1000 POUNDS WORKING GAS PRESSURE



Inside Screw Valve
Fig. 5019



Outside Screw and Yoke Valve
Fig. 599

O=Number of turns to open.

Size	A	E	F	G	H	I	K	L	O	M
1½	6	9	1⅛	13¾	13¾	6	¾	11/16	11¼	15⅝
2	6½	11	1¼	15⅝	16⅞	7½	7/8	¾	14¼	18⅞
2½	7½	13	1⅝	16⅞	17½	9	1	13/16	20¼	25
3	8¼	13	1½	21⅛	21⅝	12	1⅛	1⅞	13	28⅞
4	10	12¾	1⅝	22¾	23⅞	15	1¼	1	17	34⅞
5	11	14¼	1¾	25¾	29¼	18	1½	1⅞	11	37½
6	12½	15	1⅞	27¼	31	18	1½	1⅞	13	48⅞
8	15	18½	2¼	32¼	40⅞	21	1¾	1¼	16½	61¼
10	17½	24	2½	42	50	32	2¼	1½	23	72¼
12	20	26	2⅝	46	59¼	36	2½	1¾	26	

For drilling, see page 517, with note. For price list, see page 323.

For description, see page 321.

Inside screw valves furnished with square for wrench unless otherwise ordered.

Outside screw and yoke valves furnished with hand wheel.

GAS LINE CHECK VALVES

SEMI-STEEL. BRONZE MOUNTED. SWING TYPE.

1000 POUNDS WORKING GAS PRESSURE

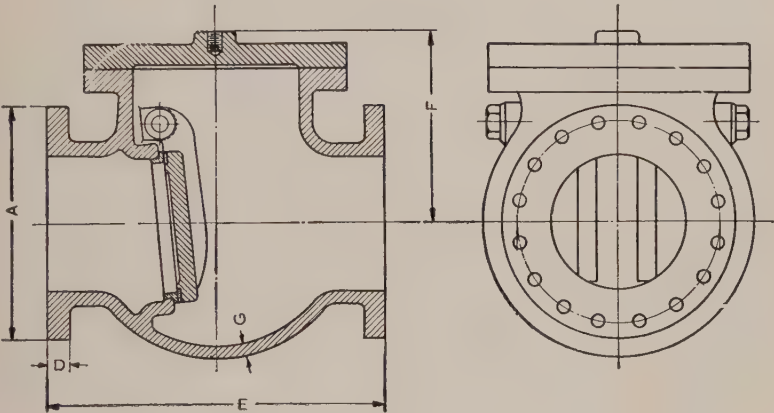


Fig. 5014

Size Inches	A	D	E	F	G
2	6½	1¼	10½	7¾	5⁄8
2½	7½	1⅜	11	8	¾
3	8¼	1½	12	9⅜	13⁄16
4	10	1⅝	14½	9⅞	7⁄8
5	11	1¾	16	9⅞	15⁄16
6	12½	1⅞	18	11⅝	1
8	15	2¼	22½	14⅞	1¼
10	17½	2½	27	15⅝	1⅜
12	20	2⅝	29	17⅞	1½

For drilling, see page 517, with note.

For price list, see page 324

SCREWED GAS LINE ELBOWS, TEES
AND 45 DEGREE Y'S

LEAD RECESS—SEMI-STEEL

1000 POUNDS WORKING GAS PRESSURE

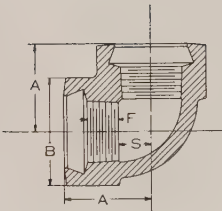


Fig. 537
90° Elbows

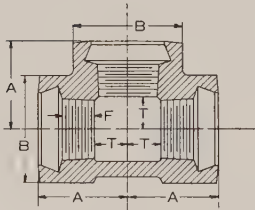


Fig. 538
Tees

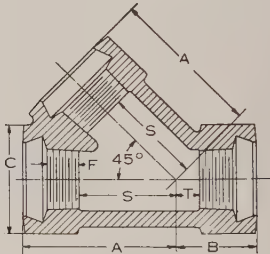


Fig. 539
45° Y's

Size Inches	A	B	F	S	Size Inches	A	B	F	T	Size Inches	A	B	C	F	S	T
2	3 3/8	4 1/8	1 1/4	1 1/4	2	3 3/8	4 1/8	1 1/4	1 1/4	2	5 3/4	3	4 1/8	1 1/4	3 5/8	7/8
3	4 1/2	5 5/8	1 9/16	2 1/16	3	4 1/2	5 5/8	1 9/16	2 1/16	3	8 1/8	3 1/2	5 5/8	1 9/16	5 11/16	1 1/16
4	5 1/4	7 1/8	1 11/16	2 5/8	4	5 1/4	7 1/8	1 11/16	2 5/8	4	9 11/16	3 15/16	7 1/8	1 11/16	7 1/16	1 5/16
6	6 9/16	9 11/16	1 7/8	3 11/16	6	6 9/16	9 11/16	1 7/8	3 11/16	6	12 3/4	4 7/8	9 11/16	1 7/8	9 7/8	2
8	7 15/16	12 3/8	2 1/8	4 13/16	8	7 15/16	12 3/8	2 1/8	4 13/16	8	15 3/4	5 1/2	12 3/8	2 1/8	12 5/8	2 3/8
10	10	14 1/2	2 5/16	6 7/16	10	10	14 1/2	2 5/16	6 7/16	10	18 3/4	6 3/8	14 1/2	2 5/16	15 3/16	2 13/16
12	11 1/8	17 3/16	2 1/2	7 3/8	12	11 1/8	17 3/16	2 1/2	7 3/8	12	21 3/4	7 1/8	17 3/16	2 1/2	18	3 3/8

For price list, see page 325.

LEAD RECESSED GAS LINE SCREWED
FLANGES

SEMI-STEEL

1000 POUNDS WORKING GAS PRESSURE

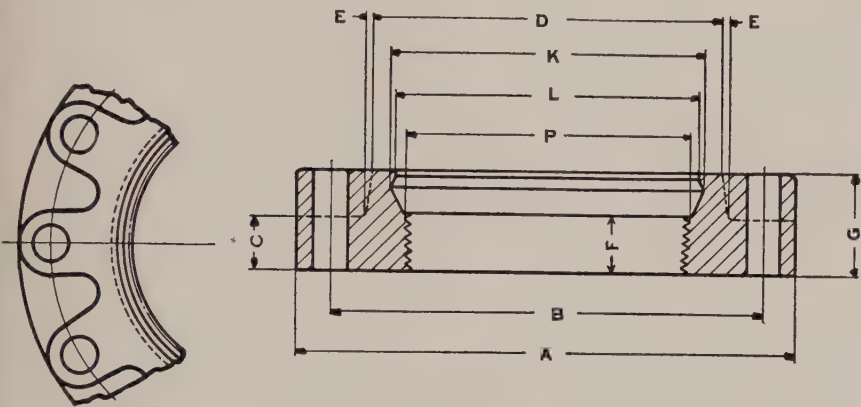














Fig. 5007

Size Inches	Number of Holes	Diam- eter of Holes	A	B	C	D	E	F	G	K	L	P
2	4	$\frac{7}{8}$	$6\frac{1}{2}$	5	$\frac{7}{8}$	$3\frac{3}{4}$	$\frac{1}{16}$	$\frac{3}{4}$	$2\frac{1}{16}$	3	$2\frac{3}{4}$	$2\frac{3}{8}$
3	8	$\frac{7}{8}$	$8\frac{1}{4}$	$6\frac{5}{8}$	$1\frac{1}{8}$	$5\frac{1}{8}$	$\frac{1}{8}$	$1\frac{3}{16}$	$2\frac{5}{16}$	$4\frac{1}{8}$	$3\frac{7}{8}$	$3\frac{1}{2}$
4	8	1	10	$7\frac{7}{8}$	$1\frac{1}{4}$	6	$\frac{1}{8}$	$1\frac{5}{16}$	$2\frac{7}{16}$	$5\frac{1}{8}$	$4\frac{7}{8}$	$4\frac{1}{2}$
5	8	1	11	$9\frac{1}{4}$	$1\frac{3}{8}$	$7\frac{1}{8}$	$\frac{1}{8}$	$1\frac{3}{8}$	$2\frac{9}{16}$	$6\frac{3}{16}$	$5\frac{5}{16}$	$5\frac{9}{16}$
6	12	1	$12\frac{1}{2}$	$10\frac{5}{8}$	$1\frac{7}{16}$	$8\frac{1}{2}$	$\frac{1}{8}$	$1\frac{1}{2}$	$2\frac{13}{16}$	$7\frac{3}{8}$	$7\frac{1}{8}$	$6\frac{5}{8}$
8	12	$1\frac{1}{8}$	15	13	$1\frac{5}{8}$	$10\frac{1}{2}$	$\frac{3}{16}$	$1\frac{1}{16}$	3	$9\frac{3}{8}$	$9\frac{1}{8}$	$8\frac{5}{8}$
10	16	$1\frac{1}{8}$	$17\frac{1}{2}$	$15\frac{1}{4}$	$1\frac{7}{8}$	$12\frac{3}{4}$	$\frac{3}{16}$	$1\frac{5}{16}$	$3\frac{1}{4}$	$11\frac{1}{2}$	$11\frac{1}{4}$	$10\frac{3}{4}$
12	16	$1\frac{1}{4}$	20	$17\frac{3}{4}$	2	15	$\frac{1}{4}$	$2\frac{1}{8}$	$3\frac{5}{8}$	$13\frac{5}{8}$	$13\frac{1}{4}$	$12\frac{3}{4}$

For price list, see page 326.

NOTE.—The drilling as shown above is standard with many large Gas Companies. The same does not conform to the American Standard. Material with the American Standard drilling can be furnished if so ordered. See page 473 for American Standard Drilling.

DIMENSIONS OF BOLTS AND NUTS*

Diameter Bolt	Threads per Inch	Diameter at Root	Area at Root	Hexagon Head			Hexagon Nut			Square Head			Square Nut			Total Load at Root of Thread at 10,000 Lbs. per Square Inch
																
1/4	20	.185	.026	3/8	29/64	3/16	1/2	37/64	1/4	3/8	17/32	3/16	1/2	45/64	1/4	260
5/16	18	.240	.045	15/32	35/64	15/16	19/32	11/16	5/16	15/16	21/32	15/16	19/32	27/32	5/16	450
3/8	16	.294	.067	9/16	41/64	9/32	11/16	51/64	3/8	9/16	51/64	9/32	11/16	63/64	3/8	670
7/16	14	.344	.092	21/32	3/4	21/64	25/32	29/32	7/16	21/32	59/64	21/32	25/32	17/16	7/16	920
1/2	13	.400	.125	3/4	7/8	3/8	7/8	1	1/2	3/4	17/16	3/8	7/8	15/8	1/2	1250
9/16	12	.454	.161	27/32	83/64	27/64	31/32	11/8	9/16	27/32	17/16	27/64	31/32	13/8	9/16	1610
5/8	11	.507	.201	15/16	13/32	15/32	11/16	17/32	5/8	15/16	121/64	15/32	11/16	11/2	5/8	2010
3/4	10	.620	.301	11/8	119/64	9/16	11/4	17/16	3/4	11/8	132/64	9/16	11/4	149/64	3/4	3010
7/8	9	.731	.419	15/16	133/64	21/32	17/16	121/32	7/8	15/16	155/64	21/32	17/16	211/32	7/8	4190
1	8	.837	.550	11/2	147/64	3/4	15/8	17/8	1	11/2	211/8	3/4	15/8	219/4	1	5500
1 1/8	7	.940	.693	111/16	161/64	27/32	113/16	23/32	11/8	111/16	225/64	27/32	113/16	29/16	11/8	6930
1 1/4	7	1.065	.890	17/8	211/64	15/16	2	25/16	11/4	17/8	221/32	15/16	2	253/4	11/4	8900
1 3/8	6	1.160	1.056	21/16	225/64	11/32	23/16	213/32	13/8	21/16	224/64	11/32	23/16	33/32	13/8	10560
1 1/2	6	1.284	1.294	21/4	239/64	11/8	23/8	23/4	11/2	21/4	33/16	11/8	23/8	33/4	11/2	12940
1 5/8	5 1/2	1.389	1.515	27/16	243/64	17/32	29/16	231/32	15/8	27/16	329/64	17/32	29/16	35/8	15/8	15150
1 3/4	5	1.491	1.746	25/8	31/32	15/16	23/4	33/16	13/4	25/8	332/32	15/16	23/4	357/4	13/4	17460
1 7/8	5	1.616	2.051	213/16	31/4	113/32	215/16	313/32	17/8	213/16	334/64	113/32	215/16	43/2	17/8	20510
2	4 1/2	1.712	2.301	3	315/32	11/2	31/8	35/8	2	3	41/4	11/2	31/8	427/4	2	23010
2 1/8	4 1/2	1.836	2.646	33/16	311/16	113/32	35/16	353/4	21/8	33/16	41/2	113/32	35/16	411/16	21/8	26460
2 1/4	4 1/2	1.961	3.021	33/8	323/32	111/16	31/2	43/4	21/4	33/8	425/32	111/16	31/2	411/4	21/4	30210

*Above dimensions are based on manufacturers' standard heads and United States Standard nuts.

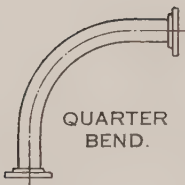
WEIGHTS OF MACHINE BOLTS

SQUARE HEAD AND NUTS

POUNDS PER 100

Size. inch.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
$1\frac{1}{2}$	3.08	5.9	9.66	12.8	17.9	31.8	52.6	81.3	.....	.....	.....	.....	.....
2	3.43	6.8	10.94	14.5	20.4	36.7	57.6	90.6	137.5	178.	235.4	.....	.....
$2\frac{1}{2}$	4.45	7.8	12.7	17.3	24.9	41.6	63.4	98.6	149.	193.	254.	.....	.....
3	5.45	8.7	14.4	18.8	27.6	45.4	69.8	106.3	161.	208.	272.	358.	458.
$3\frac{1}{2}$	6.46	9.7	15.8	20.9	29.7	49.3	75.9	114.3	172.	223.	291.	379.	483.
4	7.1	10.7	17.3	23.1	32.9	53.2	81.8	122.3	182.	238.	309.	399.	508.
$4\frac{1}{2}$	7.7	11.7	18.8	25.3	35.0	57.0	87.6	130.3	193.	252.	327.	420.	533.
5	8.3	12.7	20.2	27.5	36.0	61.9	93.5	138.3	204.	267.	346.	440.	558.
$5\frac{1}{2}$	8.9	13.7	21.6	29.6	38.6	65.8	99.5	146.3	215.	282.	364.	461.	583.
6	9.5	14.7	23.0	31.7	41.2	68.9	105.2	154.	226.	297.	382.	481.	608.
$6\frac{1}{2}$	10.2	15.7	24.4	33.9	43.8	72.8	111.	162.	236.	312.	399.	502.	633.
7	10.8	16.7	25.9	35.7	46.4	76.7	117.	170.	247.	317.	416.	522.	658.
$7\frac{1}{2}$	11.5	17.7	27.4	37.6	49.0	80.6	123.	178.	258.	322.	433.	543.	683.
8	12.1	18.7	28.8	39.0	51.6	84.5	129.	186.	269.	337.	450.	563.	708.
9	13.4	20.8	31.8	43.2	56.8	92.2	141.	202.	290.	366.	483.	604.	758.
10	14.6	22.9	34.8	47.4	62.0	99.9	153.	218.	312.	396.	517.	645.	808.
11	.....	.....	37.7	51.6	67.2	108.	165.	234.	334.	426.	551.	686.	858.
12	.....	.....	40.7	55.8	72.4	115.	177.	250.	355.	455.	585.	727.	908.
13	.....	.....	.....	.....	77.6	123.	189.	266.	377.	485.	618.	768.	958.
14	.....	.....	.....	.....	82.8	131.	201.	282.	398.	515.	652.	809.	1008.
15	.....	.....	.....	.....	88.0	139.	213.	298.	420.	545.	686.	850.	1058.
16	.....	.....	.....	.....	93.2	146.	225.	314.	442.	574.	719.	891.	1108.

PIPE BENDS



QUARTER BEND.



SINGLE OFFSET QUARTER BEND.



45 DEGREE BEND.



CROSS OVER



OFFSET



SINGLE OFFSET U BEND



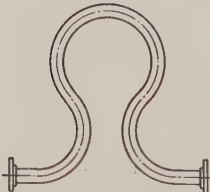
U BEND



DOUBLE OFFSET U BEND



EXPANSION U BEND.



DOUBLE OFFSET EXPANSION U BEND.



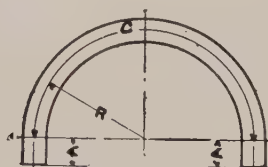
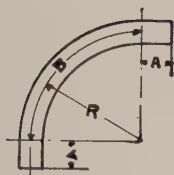
CIRCLE BEND.

Estimates for pipe bends of any description will be furnished upon application. For standard and minimum radii see pages 521 and 522.

STANDARD PIPE BENDS

FULL WEIGHT PIPE

APPROXIMATE TO NEAREST $\frac{1}{8}$ INCH



Size Inches	A		B		C		R		Total Pipe Required 90° Bend		Total Pipe Required 180° Bend	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
1		2		9 $\frac{3}{8}$		18 $\frac{3}{4}$		6		13 $\frac{3}{8}$		22 $\frac{3}{4}$
1 $\frac{1}{4}$		2		11 $\frac{3}{4}$		23 $\frac{1}{2}$		7 $\frac{1}{2}$		15 $\frac{3}{4}$	2	3 $\frac{1}{2}$
1 $\frac{1}{2}$		2 $\frac{1}{2}$		14 $\frac{1}{8}$	2	4 $\frac{1}{4}$		9		19 $\frac{1}{8}$	2	9 $\frac{1}{4}$
2		3		18 $\frac{7}{8}$	3	1 $\frac{3}{4}$		12	2	0 $\frac{7}{8}$	3	7 $\frac{3}{4}$
2 $\frac{1}{2}$		3 $\frac{1}{2}$		23 $\frac{1}{2}$	3	11		15	2	6 $\frac{1}{2}$	4	6
3		4	2	4 $\frac{1}{4}$	4	8 $\frac{1}{2}$		18	3	0 $\frac{1}{4}$	5	4 $\frac{1}{2}$
3 $\frac{1}{2}$		4 $\frac{1}{2}$	2	9	5	6		21	3	6	6	3
4		5	3	1 $\frac{3}{4}$	6	3 $\frac{1}{2}$		24	3	11 $\frac{3}{4}$	7	1 $\frac{1}{2}$
4 $\frac{1}{2}$		5 $\frac{1}{2}$	3	6 $\frac{3}{8}$	7	0 $\frac{3}{4}$	2	3	4	5 $\frac{3}{8}$	7	11 $\frac{3}{4}$
5		6	3	11 $\frac{1}{8}$	7	10 $\frac{1}{4}$	2	6	4	11 $\frac{1}{8}$	8	10 $\frac{1}{4}$
6		6	4	8 $\frac{1}{2}$	9	5	3		5	8 $\frac{1}{2}$	10	5
7		6	5	6	11		3	6	6	6	12	
8		6	6	3 $\frac{3}{8}$	12	6 $\frac{3}{4}$	4		7	3 $\frac{3}{8}$	13	6 $\frac{3}{4}$
9		6	7	0 $\frac{3}{4}$	14	1 $\frac{1}{2}$	4	6	8	0 $\frac{3}{4}$	15	1 $\frac{1}{2}$
10		6	7	10 $\frac{1}{4}$	15	8 $\frac{1}{2}$	5		8	10 $\frac{1}{4}$	16	8 $\frac{1}{2}$
12		6	9	5	18	10	6		10	5	19	10
14		20	10	11 $\frac{7}{8}$	See Note 1		7		14	3 $\frac{7}{8}$	See Note 1	
15		20	11	9 $\frac{1}{4}$			7	6	15	1 $\frac{1}{4}$		
16		20	12	6 $\frac{3}{4}$			8		15	10 $\frac{3}{4}$		
18		24	14	1 $\frac{5}{8}$			9		18	1 $\frac{5}{8}$		
20		24	15	8 $\frac{1}{2}$			10		19	8 $\frac{1}{2}$		
22		24	17	3 $\frac{3}{8}$			11		21	3 $\frac{3}{8}$		
24		24	18	10 $\frac{1}{4}$			12		22	10 $\frac{1}{4}$		
26	2	6	See Note 2				13		See Note 2			
28	2	6					14					
30	2	6					15					

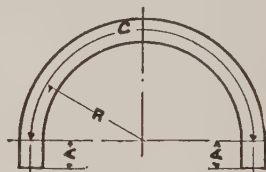
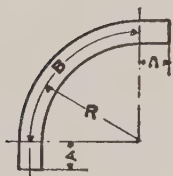
1. Special designs submitted for expansion bends of 14 inches and larger.
2. Special designs submitted for 90° bends of 26 inches and larger.
3. If plain ends are required on bends 12 inches and smaller, add 12 inches to total length.

We cannot guarantee pipe bent to above radii not to buckle.

MINIMUM PIPE BENDS

FULL WEIGHT PIPE

APPROXIMATE TO NEAREST 1/8 INCH



SIZE	A		B		C		R		Total Pipe Required 90° Bend		Total Pipe Required 180° Bend	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
1		2		4 3/8		8 3/4		2 3/4		8 3/8		12 3/8
1 1/2		2		4 3/4		9 1/2		3		8 3/4		13 1/2
1 1/2		2 1/2		5 1/2		11		3 1/2		10 1/2		16
2		3		7 1/2		15		4 3/4		13 1/2		21
2 1/2		3 1/2		11		22		7		18	2	5
3		4		14 1/8	2	4 1/2		9		22 1/8	3	0 1/2
3 1/2		4 1/2		16 1/2	2	9		10 1/2	2	1 1/2	3	6
4		5		18 7/8	3	1 3/4		12	2	4 7/8	3	11 3/4
4 1/2		5 1/2		20 3/8	3	4 3/4		13	2	7 3/8	4	3 3/4
5		6		23 1/2	3	11		15	2	11 1/2	4	11
6		6	2	4 1/2	4	8 1/2		18	3	4 1/2	5	8 1/2
7		6	3	1 3/4	6	3 1/2		24	4	1 3/4	7	3 1/2
8		6	3	11 3/8	7	10 1/2	2	6	4	11 3/8	8	10 1/2
9		6	4	8 1/2	9	5	3	0	5	8 1/2	10	5
10		6	5	6	11	0	3	6	6	6	12	0
12		6	6	9 5/8	13	7 1/2	4	4	7	9 5/8	14	7 1/2
14		20	8	3	See Note "1"		5	3	11	7	See Note "1"	
15		20	9	0 3/8	"	"	5	9	12	4 3/8	"	"
16		20	9	9 1/4	"	"	6	3	13	1 3/4	"	"
18		24	11	4 5/8	"	"	7	3	15	4 5/8	"	"
20		24	12	6 3/4	"	"	8	0	16	6 3/4	"	"
22		24	14	1 1/8	"	"	9	0	18	1 1/8	"	"
24		24	15	8 1/2	"	"	10	0	19	8 1/2	"	"
26	2	6	See Note "2"		"	"	12	0	See Note "2"		"	"
28	2	6	"	"	"	"	16	0	"	"	"	"
30	2	6	"	"	"	"	18	0	"	"	"	"

1. Special designs submitted for expansion bends of 14 inches and larger.
 2. Special designs submitted for 90° bends of 26 inches and larger.
 3. If plain ends are required on bends 12 inches and smaller, add 12 inches to total length.
- We cannot guarantee pipe bent to above radii not to buckle.
X strong pipe can be bent to a shorter radius than that shown.

Length of 90° Arc from Radius = 1' to 15' 11" Approximate to Nearest $\frac{1}{8}$ ".

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Radius Feet	0-IN.	1-IN.	2-IN.	3-IN.	4-IN.	5-IN.	6-IN.	7-IN.	8-IN.	9-IN.	10-IN.	11-IN.	Radius Feet
.....	.....	1 $\frac{5}{8}$ "	3 $\frac{1}{2}$ "	4 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "	7 $\frac{1}{2}$ "	9 $\frac{3}{8}$ "	11	1'-0 $\frac{1}{4}$ "	1'-2 $\frac{1}{8}$ "	1'-3 $\frac{3}{4}$ "	1'-5 $\frac{1}{4}$"	.....
1	1'-6 $\frac{1}{2}$ "	1'-8 $\frac{3}{8}$ "	1'-10"	1'-11 $\frac{1}{2}$ "	2'-1 $\frac{1}{8}$ "	2'-2 $\frac{3}{4}$ "	2'-4 $\frac{1}{4}$ "	2'-5 $\frac{7}{8}$ "	2'-7 $\frac{7}{8}$ "	2'-9"	2'-10 $\frac{1}{2}$ "	3'-0 $\frac{1}{8}$ "	1
2	3'-1 $\frac{1}{2}$ "	3'-3 $\frac{1}{4}$ "	3'-4 $\frac{1}{2}$ "	3'-6 $\frac{3}{8}$ "	3'-8"	3'-9 $\frac{1}{2}$ "	3'-11 $\frac{1}{8}$ "	4'-0 $\frac{3}{4}$ "	4'-2 $\frac{1}{4}$ "	4'-3 $\frac{3}{4}$ "	4'-5 $\frac{3}{8}$ "	4'-7"	2
3	4'-8 $\frac{1}{2}$ "	4'-10 $\frac{1}{8}$ "	4'-11 $\frac{1}{8}$ "	5'-1 $\frac{1}{4}$ "	5'-2 $\frac{3}{4}$ "	5'-4 $\frac{3}{8}$ "	5'-6"	5'-7 $\frac{1}{4}$ "	5'-9 $\frac{1}{4}$ "	5'-10 $\frac{1}{8}$ "	6'-0 $\frac{1}{4}$ "	6'-1 $\frac{3}{4}$ "	3
4	6'-3 $\frac{3}{8}$ "	6'-5"	6'-6 $\frac{1}{2}$ "	6'-8 $\frac{1}{4}$ "	6'-9 $\frac{5}{8}$ "	6'-11 $\frac{1}{4}$ "	7'-0 $\frac{3}{4}$ "	7'-2 $\frac{3}{8}$ "	7'-4"	7'-5 $\frac{1}{2}$ "	7'-7 $\frac{1}{8}$ "	7'-8 $\frac{5}{8}$ "	4
5	7'-10 $\frac{1}{4}$ "	7'-11 $\frac{1}{4}$ "	8'-1 $\frac{3}{8}$ "	8'-3"	8'-4 $\frac{1}{2}$ "	8'-6 $\frac{1}{8}$ "	8'-7 $\frac{5}{8}$ "	8'-9 $\frac{1}{4}$ "	8'-10 $\frac{3}{4}$ "	9'-0 $\frac{3}{8}$ "	9'-1 $\frac{7}{8}$ "	9'-3 $\frac{1}{2}$ "	5
6	9'-5"	9'-6 $\frac{3}{8}$ "	9'-8 $\frac{1}{4}$ "	9'-9 $\frac{3}{4}$ "	9'-11 $\frac{1}{8}$ "	10'-0 $\frac{1}{8}$ "	10'-2 $\frac{1}{4}$ "	10'-4"	10'-5 $\frac{5}{8}$ "	10'-7 $\frac{1}{8}$ "	10'-8 $\frac{3}{4}$ "	10'-10 $\frac{3}{8}$ "	6
7	10'-11 $\frac{1}{8}$ "	11'-1 $\frac{1}{4}$ "	11'-3"	11'-4 $\frac{3}{8}$ "	11'-6 $\frac{1}{4}$ "	11'-7 $\frac{3}{4}$ "	11'-9 $\frac{1}{4}$ "	11'-10 $\frac{1}{2}$ "	12'-0 $\frac{1}{4}$ "	12'-2"	12'-3 $\frac{3}{8}$ "	12'-5 $\frac{1}{4}$ "	7
8	12'-6 $\frac{3}{4}$ "	12'-8 $\frac{1}{4}$ "	12'-9 $\frac{1}{2}$ "	12'-11 $\frac{1}{2}$ "	13'-1"	13'-2 $\frac{5}{8}$ "	13'-4 $\frac{1}{8}$ "	13'-5 $\frac{3}{4}$ "	13'-7 $\frac{1}{4}$ "	13'-8 $\frac{7}{8}$ "	13'-10 $\frac{1}{2}$ "	14'-0"	8
9	14'-1 $\frac{5}{8}$ "	14'-3 $\frac{1}{4}$ "	14'-4 $\frac{3}{4}$ "	14'-6 $\frac{1}{4}$ "	14'-8"	14'-9 $\frac{1}{2}$ "	14'-11 $\frac{1}{8}$ "	15'-0 $\frac{1}{8}$ "	15'-2 $\frac{1}{4}$ "	15'-3 $\frac{3}{4}$ "	15'-5 $\frac{3}{8}$ "	15'-6 $\frac{1}{4}$ "	9
10	15'-8 $\frac{1}{4}$ "	15'-10 $\frac{1}{8}$ "	15'-11 $\frac{1}{8}$ "	16'-1 $\frac{1}{4}$ "	16'-2 $\frac{3}{4}$ "	16'-4 $\frac{3}{8}$ "	16'-5 $\frac{1}{2}$ "	16'-7 $\frac{1}{2}$ "	16'-9 $\frac{3}{8}$ "	16'-10 $\frac{1}{8}$ "	17'-0 $\frac{1}{4}$ "	17'-1 $\frac{3}{4}$ "	10
11	17'-3 $\frac{3}{8}$ "	17'-4 $\frac{7}{8}$ "	17'-6 $\frac{1}{2}$ "	17'-8 $\frac{1}{8}$ "	17'-9 $\frac{3}{8}$ "	17'-11 $\frac{1}{4}$ "	18'-0 $\frac{1}{4}$ "	18'-2 $\frac{3}{8}$ "	18'-3 $\frac{1}{2}$ "	18'-5 $\frac{1}{4}$ "	18'-7 $\frac{1}{8}$ "	18'-8 $\frac{5}{8}$ "	11
12	18'-10 $\frac{1}{4}$ "	18'-11 $\frac{3}{4}$ "	19'-1 $\frac{3}{8}$ "	19'-2 $\frac{1}{2}$ "	19'-4 $\frac{1}{2}$ "	19'-6"	19'-7 $\frac{5}{8}$ "	19'-9 $\frac{1}{4}$ "	19'-10 $\frac{3}{4}$ "	20'-0 $\frac{1}{4}$ "	20'-1 $\frac{1}{8}$ "	20'-3 $\frac{1}{2}$ "	12
13	20'-5"	20'-6 $\frac{3}{8}$ "	20'-8 $\frac{1}{4}$ "	20'-9 $\frac{3}{8}$ "	20'-11 $\frac{1}{4}$ "	21'-0 $\frac{1}{8}$ "	21'-2 $\frac{1}{4}$ "	21'-4"	21'-5 $\frac{5}{8}$ "	21'-7 $\frac{1}{4}$ "	21'-8 $\frac{3}{4}$ "	21'-10 $\frac{1}{4}$ "	13
14	21'-11 $\frac{1}{8}$ "	22'-1 $\frac{1}{2}$ "	22'-3"	22'-4 $\frac{5}{8}$ "	22'-6 $\frac{1}{4}$ "	22'-7 $\frac{3}{4}$ "	22'-9 $\frac{1}{4}$ "	22'-10 $\frac{1}{8}$ "	23'-0 $\frac{1}{4}$ "	23'-2"	23'-3 $\frac{3}{8}$ "	23'-5 $\frac{1}{8}$ "	14
15	23'-6 $\frac{3}{4}$ "	23'-8 $\frac{1}{4}$ "	23'-9 $\frac{1}{2}$ "	23'-11 $\frac{1}{2}$ "	24'-1"	24'-2 $\frac{5}{8}$ "	24'-4 $\frac{1}{8}$ "	24'-5 $\frac{3}{4}$ "	24'-7 $\frac{1}{4}$ "	24'-8 $\frac{1}{2}$ "	24'-10 $\frac{1}{2}$ "	25'-0"	15

**Length of Circular Arc Subtended by Any Angle
Radius Being = 1.00.**

—°	ARC	—°	ARC	—°	ARC	—°	ARC	—°	ARC
1	.0175	19	.3316	37	.6458	55	.9599	73	1.2741
2	.0349	20	.3491	38	.6632	56	.9774	74	1.2915
3	.0524	21	.3665	39	.6807	57	.9948	75	1.3090
4	.0698	22	.3840	40	.6981	58	1.0123	76	1.3264
5	.0873	23	.4014	41	.7156	59	1.0297	77	1.3439
6	.1047	24	.4186	42	.7330	60	1.0472	78	1.3613
7	.1222	25	.4363	43	.7505	61	1.0646	79	1.3788
8	.1396	26	.4538	44	.7679	62	1.0821	80	1.3962
9	.1571	27	.4712	45	.7854	63	1.0995	81	1.4137
10	.1745	28	.4887	46	.8028	64	1.1170	82	1.4312
11	.1920	29	.5061	47	.8203	65	1.1344	83	1.4486
12	.2094	30	.5236	48	.8377	66	1.1519	84	1.4661
13	.2269	31	.5411	49	.8552	67	1.1693	85	1.4835
14	.2443	32	.5585	50	.8726	68	1.1868	86	1.5010
15	.2618	33	.5760	51	.8901	69	1.2043	87	1.5184
16	.2792	34	.5934	52	.9076	70	1.2217	88	1.5359
17	.2967	35	.6109	53	.9250	71	1.2392	89	1.5533
18	.3141	36	.6283	54	.9425	72	1.2566	90	1.5708

To obtain length of any arc in inches: Multiply the figures from table corresponding to the number of degrees in the subtending angle by the radius of arc in inches.

STANDARD THICKNESSES AND WEIGHTS OF CAST IRON FLANGED PIPE

(FROM CATALOGUE OF UNITED STATES CAST IRON PIPE
AND FOUNDRY COMPANY)

Nominal Inside Diameter Inches	Diameter of Flange, Inches	Diameter Bolt Circle, Inches	Number of Bolts	Diameter of Bolts, Inches	Class A —100-Foot Head 43 Pounds Pressure				Class B—200-Foot Head 86 Pounds Pressure				Nominal Inside Diameter Inches
					Thickness Inches	Weight, Pounds Per			Thickness Inches	Weight, Pounds Per			
						Foot	Length	Single Flange		Foot	Length	Single Flange	
3	7.50	6.00	4	$\frac{5}{8}$	.39	13.0	168	5.8	.42	14.6	188	6.3	3
4	9.00	7.50	8	$\frac{5}{8}$	.42	18.0	234	9.0	.45	20.1	259	9.1	4
6	11.00	9.50	8	$\frac{3}{4}$	.44	27.9	358	11.8	.48	31.1	398	12.3	6
8	13.50	11.75	8	$\frac{3}{4}$	.46	38.7	498	16.9	.51	42.7	549	18.2	8
10	16.00	14.25	12	$\frac{7}{8}$	.50	51.9	671	23.9	.57	58.8	759	26.6	10
12	19.00	17.00	12	$\frac{7}{8}$	.54	67.0	876	35.8	.62	76.4	998	40.4	12
14	21.00	18.75	12	1	.57	82.3	1070	41.4	.66	94.7	1231	47.3	14
16	23.50	21.25	16	1	.60	98.8	1290	52.5	.70	114.6	1495	60.1	16
18	25.00	22.75	16	1 $\frac{1}{8}$	.64	118.3	1528	54.5	.75	137.8	1779	62.5	18
20	27.50	25.00	20	1 $\frac{1}{8}$	.67	137.4	1783	66.8	.80	163.1	2114	78.7	20
24	32.00	29.50	20	1 $\frac{1}{4}$	.76	186.5	2424	92.9	.89	217.3	2821	106.8	24
30	38.75	36.00	28	1 $\frac{3}{8}$	.88	266.1	3486	146.1	1.03	312.6	4077	162.9	30
36	46.00	42.75	32	1 $\frac{1}{2}$	.99	358.7	4748	221.9	1.15	418.7	5514	245.2	36
40	50.75	47.25	36	1 $\frac{5}{8}$	1.06	427.2	5684	279.1	1.23	497.0	6586	311.2	40
42	53.00	49.50	36	1 $\frac{5}{8}$	1.10	464.6	6195	310.0	1.28	542.2	7198	346.1	42
48	59.50	56.00	44	1 $\frac{5}{8}$	1.26	608.0	8112	408.1	1.42	687.2	9132	442.9	48

Thickness of flange equals approximately 1 $\frac{1}{2}$ times thickness of pipe plus $\frac{1}{8}$ inch. Flanges drilled to "American 1914 Standard" templates. Bolt holes drilled $\frac{1}{8}$ inch larger than bolts. All dimensions in inches. Pipe made in 12-foot lengths and faced $\frac{1}{8}$ inch short for gaskets; special short lengths made to order. Above are neat finished weights. Allowance must be made for variation and finish. All weights are approximate.

Continued on page 527.

STANDARD THICKNESSES AND WEIGHTS OF CAST IRON FLANGED PIPE

(FROM CATALOGUE OF UNITED STATES CAST IRON PIPE
AND FOUNDRY COMPANY)

Nominal Inside Diameter Inches	Diameter of Flange, Inches	Diameter Bolt Circle, Inches	Number of Bolts	Diameter of Bolts, Inches	Class C—300-Foot Head 130 Pounds Pressure				Class D—400-Foot Head 173 Pounds Pressure				Nominal Inside Diameter Inches
					Thickness Inches	Weight, Pounds Per			Thickness Inches	Weight, Pounds Per			
						Foot	Length	Single Flange		Foot	Length	Single Flange	
3	7.50	6.00	4	$\frac{5}{8}$	.45	15.5	199	6.6	.48	16.4	211	7.1	3
4	9.00	7.50	8	$\frac{5}{8}$	.48	21.3	275	9.7	.52	22.8	295	10.4	4
6	11.00	9.50	8	$\frac{3}{4}$	.51	32.9	421	12.8	.55	35.3	451	13.7	6
8	13.50	11.75	8	$\frac{3}{4}$	.56	48.0	614	19.0	.60	51.2	654	20.1	8
10	16.00	14.25	12	$\frac{7}{8}$	.62	65.5	840	27.3	.68	71.4	916	29.6	10
12	19.00	17.00	12	$\frac{7}{8}$	.68	85.4	1109	42.0	.75	93.7	1216	45.6	12
14	21.00	18.75	12	1	.74	108.1	1397	49.6	.82	119.2	1539	54.5	14
16	23.50	21.25	16	1	.80	133.3	1727	63.9	.89	147.5	1910	70.2	16
18	25.00	22.75	16	1 $\frac{1}{8}$	.87	162.4	2083	66.9	.96	178.4	2287	73.4	18
20	27.50	25.00	20	1 $\frac{1}{8}$	.92	190.6	2454	83.3	1.03	212.3	2731	92.1	20
24	32.00	29.50	20	1 $\frac{1}{4}$	1.04	257.6	3321	114.7	1.16	286.0	3686	126.9	24
	38.75	36.00	28	1 $\frac{3}{8}$	1.20	366.9	4759	178.1	1.37	421.2	5436	191.0	30
36	46.00	42.75	32	1 $\frac{1}{2}$	1.36	497.7	6519	273.3	1.58	581.9	7577	296.8	36
40	50.75	47.25	36	1 $\frac{5}{8}$	1.48	601.6	7921	350.7	1.72	703.4	9203	389.0	40
42	53.00	49.50	36	1 $\frac{5}{8}$	1.54	657.4	8660	385.3	1.78	764.1	10004	417.5	42
48	59.50	56.00	44	1 $\frac{5}{8}$	1.71	832.7	10979	493.4	1.96	960.8	12578	524.3	48

Thickness of flange equals approximately $1\frac{1}{2}$ times thickness of pipe plus $\frac{1}{8}$ inch. Flanges drilled to "American 1914 Standard" templates. Bolt holes drilled $\frac{1}{8}$ inch larger than bolts. All dimensions in inches. Pipe made in 12-foot lengths and faced $\frac{1}{8}$ inch short for gaskets; special short lengths made to order. Above are neat finished weights. Allowance must be made for variation and finish. All weights are approximate.

STANDARD THICKNESSES AND WEIGHTS OF CAST IRON BELL AND SPIGOT PIPE

(FROM CATALOGUE OF UNITED STATES CAST IRON PIPE
AND FOUNDRY COMPANY)

Nominal Inside Diameter, Inches	Class A 100-Foot Head 43 Lbs. Pressure			Class B 200-Foot Head 86 Lbs. Pressure			Class C 300-Foot Head 130 Lbs. Pressure			Class D 400-Foot Head 173 Lbs. Pressure			Approximate Pounds Lead per Joint 2 Inches Thick	Approximate Pounds Hemp per Joint Nominal Inside Diameter, Inches	
	Thickness Inches	Pounds Per		Thickness Inches	Pounds Per		Thickness Inches	Pounds Per		Thickness Inches	Pounds Per				
		Foot	Length		Foot	Length		Foot	Length		Foot	Length			
3	.39	14.5	175	.42	16.2	194	.45	17.1	205	.48	18.0	216	6.00	.18	3
4	.42	20.0	240	.45	21.7	260	.48	23.3	280	.52	25.0	300	7.50	.21	4
6	.44	30.8	370	.48	33.3	400	.51	35.8	430	.55	38.3	460	10.25	.31	6
8	.46	42.9	515	.51	47.5	570	.56	52.1	625	.60	55.8	670	13.25	.44	8
10	.50	57.1	685	.57	63.8	765	.62	70.8	850	.68	76.7	920	16.00	.53	10
12	.54	72.5	870	.62	82.1	985	.68	91.7	1100	.75	100.0	1200	19.00	.61	12
14	.57	89.6	1075	.66	102.5	1230	.74	116.7	1400	.82	129.2	1550	22.00	.81	14
16	.60	108.3	1300	.70	125.0	1500	.80	143.8	1725	.89	158.3	1900	30.00	.94	16
18	.64	129.2	1550	.75	150.0	1800	.87	175.0	2100	.96	191.7	2300	33.80	1.00	18
20	.67	150.0	1800	.80	175.0	2100	.92	208.3	2500	1.03	229.2	2750	37.00	1.25	20
24	.76	204.2	2450	.89	233.3	2800	1.04	279.2	3350	1.16	306.7	3680	44.00	1.50	24
30	.88	291.7	3500	1.03	333.3	4000	1.20	400.0	4800	1.37	450.0	5400	54.25	2.06	30
36	.99	391.7	4700	1.15	454.2	5450	1.36	545.8	6550	1.58	625.0	7500	64.75	3.00	36
42	1.10	512.5	6150	1.28	591.7	7100	1.54	716.7	8600	1.78	825.0	9900	75.25	3.62	42
48	1.26	666.7	8000	1.42	750.0	9000	1.71	908.3	10900	1.96	1050.0	12600	85.50	4.37	48
54	1.35	800.0	9600	1.55	933.3	11200	1.90	1141.7	13700	2.23	1341.7	16100	97.60	6.25	54
60	1.39	916.7	11000	1.67	1104.2	13250	2.00	1341.7	16100	2.38	1583.3	19000	108.30	8.25	60
72	1.62	1281.9	15380	1.95	1547.3	18570	2.39	1904.3	22850	.....	.....	.....	131.25	12.50	72
84	1.72	1635.8	19630	2.22	2104.1	25250	.....	.....	.....	.....	.....	.....	152.00	15.00	84

All lengths to lay 12 feet. All weights are approximate; those per foot include allowance for bell; those per length include standard bell; proportionate allowance to be made for any variation from the standard length.

STANDARD BOWLS

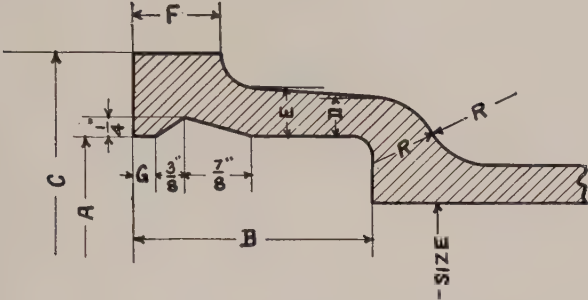


Fig. 9008

Size Inches	A	B	C	D	E	F	G	R
3	4 ³ / ₄	3	7	1 ¹ / ₂	5 ⁸ / ₈	1	1 ¹ / ₄	7 ⁸ / ₈
4	5 ³ / ₄	3	7 ⁷ / ₈	1 ¹ / ₂	5 ⁸ / ₈	1 ¹ / ₈	1 ¹ / ₄	7 ⁸ / ₈
5	6 ⁷ / ₈	3 ¹ / ₂	9 ¹ / ₄	9 ¹⁶ / ₁₆	11 ¹⁶ / ₁₆	1 ¹ / ₈	1 ¹ / ₄	15 ¹⁶ / ₁₆
6	8	3 ¹ / ₂	10 ³ / ₈	5 ⁸ / ₈	3 ⁴ / ₄	1 ¹ / ₈	1 ¹ / ₄	1
7	9	3 ¹ / ₂	11 ¹ / ₂	5 ⁸ / ₈	3 ⁴ / ₄	1 ¹ / ₄	1 ¹ / ₄	1
8	10	4	12 ¹ / ₂	5 ⁸ / ₈	3 ⁴ / ₄	1 ¹ / ₄	1 ¹ / ₄	1
9	11	4	13 ⁵ / ₈	3 ⁴ / ₄	7 ⁸ / ₈	1 ¹ / ₄	1 ¹ / ₄	1 ¹ / ₈
10	12 ¹ / ₈	4	14 ³ / ₄	3 ⁴ / ₄	7 ⁸ / ₈	1 ¹ / ₄	1 ¹ / ₄	1 ¹ / ₈
12	14 ¹ / ₄	4 ¹ / ₂	17 ¹ / ₄	13 ¹⁶ / ₁₆	15 ¹⁶ / ₁₆	1 ¹ / ₄	5 ¹⁶ / ₁₆	13 ¹⁶ / ₁₆
14	16 ³ / ₈	4 ¹ / ₂	19 ⁵ / ₈	7 ⁸ / ₈	1	1 ¹ / ₂	5 ¹⁶ / ₁₆	1 ¹ / ₄
15	17 ³ / ₈	4 ¹ / ₂	20 ³ / ₄	7 ⁸ / ₈	1	1 ¹ / ₂	5 ¹⁶ / ₁₆	1 ¹ / ₄
16	18 ¹ / ₂	4 ¹ / ₂	21 ³ / ₄	1	1 ¹ / ₈	1 ¹ / ₂	5 ¹⁶ / ₁₆	13 ⁸ / ₈
18	20 ⁵ / ₈	4 ¹ / ₂	23 ⁷ / ₈	1	1 ¹ / ₈	13 ⁴ / ₄	5 ¹⁶ / ₁₆	17 ¹⁶ / ₁₆
20	22 ³ / ₄	4 ¹ / ₂	26 ¹ / ₄	1	1 ¹ / ₈	13 ⁴ / ₄	3 ⁸ / ₈	17 ¹⁶ / ₁₆
22	24 ⁷ / ₈	5	28 ¹ / ₂	1 ¹ / ₁₆	13 ¹⁶ / ₁₆	2	3 ⁸ / ₈	1 ¹ / ₂
24	27	5	30 ⁵ / ₈	1 ¹ / ₈	1 ¹ / ₄	2	3 ⁸ / ₈	19 ¹⁶ / ₁₆
26	29 ¹ / ₈	5	32 ³ / ₄	1 ¹ / ₈	1 ¹ / ₄	2	3 ⁸ / ₈	19 ¹⁶ / ₁₆
28	31 ¹ / ₄	5	35	13 ¹⁶ / ₁₆	15 ¹⁶ / ₁₆	2	3 ⁸ / ₈	13 ⁸ / ₈
30	33 ³ / ₈	5	37 ¹ / ₂	1 ¹ / ₄	13 ⁸ / ₈	2	3 ⁸ / ₈	19 ¹⁶ / ₁₆
36	39 ³ / ₄	5	44 ¹ / ₂	13 ⁸ / ₈	1 ¹ / ₂	2	3 ⁸ / ₈	13 ¹⁶ / ₁₆
42	46 ¹ / ₈	5	51 ¹ / ₂	19 ¹⁶ / ₁₆	19 ¹⁶ / ₁₆	2	3 ⁸ / ₈	2
48	52 ¹ / ₂	5	58 ¹ / ₂	19 ¹⁶ / ₁₆	19 ¹⁶ / ₁₆	2	3 ⁸ / ₈	27 ⁸ / ₈

The bowls here shown have been adopted for standard valves and specials after comparison with the dimensions given by the principal manufacturers of bowl and spigot pipe. Considerable disparity exists in the makers' standards and we have endeavored to design a bowl which will give the least trouble from interference, yet having the proper lead space.

EXTRA HEAVY BOWLS

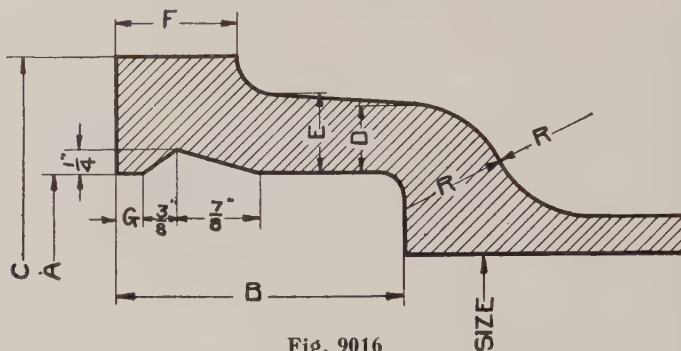


Fig. 9016

Size Inches	A	B	C	D	E	F	G	R
3	4 $\frac{3}{4}$	3	7 $\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 $\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{8}$
4	5 $\frac{3}{4}$	3	8 $\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 $\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{8}$
5	6 $\frac{7}{8}$	3 $\frac{1}{2}$	9 $\frac{7}{8}$	$\frac{13}{16}$	$\frac{15}{16}$	1 $\frac{3}{8}$	$\frac{1}{4}$	1 $\frac{3}{16}$
6	8	3 $\frac{1}{2}$	11 $\frac{1}{8}$	$\frac{7}{8}$	1	1 $\frac{3}{8}$	$\frac{1}{4}$	1 $\frac{1}{4}$
7	9	3 $\frac{1}{2}$	12 $\frac{1}{8}$	$\frac{7}{8}$	1	1 $\frac{1}{2}$	$\frac{1}{4}$	1 $\frac{1}{4}$
8	10	4	13 $\frac{1}{4}$	$\frac{7}{8}$	1	1 $\frac{1}{2}$	$\frac{1}{4}$	1 $\frac{1}{4}$
9	11	4	14 $\frac{1}{4}$	$\frac{7}{8}$	1	1 $\frac{1}{2}$	$\frac{1}{4}$	1 $\frac{1}{4}$
10	12 $\frac{1}{8}$	4	15 $\frac{3}{4}$	$\frac{15}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{2}$	$\frac{1}{4}$	1 $\frac{3}{16}$
12	14 $\frac{1}{4}$	4 $\frac{1}{2}$	18	1	1 $\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{5}{16}$	1 $\frac{3}{8}$
14	16 $\frac{3}{8}$	4 $\frac{1}{2}$	20 $\frac{3}{8}$	1 $\frac{1}{16}$	1 $\frac{3}{16}$	1 $\frac{3}{4}$	$\frac{5}{16}$	1 $\frac{7}{16}$
15	17 $\frac{3}{8}$	4 $\frac{1}{2}$	21 $\frac{3}{8}$	1 $\frac{1}{16}$	1 $\frac{3}{16}$	1 $\frac{3}{4}$	$\frac{5}{16}$	1 $\frac{7}{16}$
16	18 $\frac{1}{2}$	4 $\frac{1}{2}$	22 $\frac{5}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{4}$	$\frac{5}{16}$	1 $\frac{1}{2}$
18	20 $\frac{5}{8}$	4 $\frac{1}{2}$	24 $\frac{7}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{4}$	$\frac{5}{16}$	1 $\frac{9}{16}$
20	22 $\frac{3}{4}$	4 $\frac{1}{2}$	27 $\frac{1}{8}$	1 $\frac{3}{16}$	1 $\frac{5}{16}$	1 $\frac{3}{4}$	$\frac{3}{8}$	1 $\frac{5}{8}$
22	24 $\frac{7}{8}$	5	29 $\frac{3}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{8}$	2	$\frac{3}{8}$	1 $\frac{11}{16}$
24	27	5	31 $\frac{7}{8}$	1 $\frac{5}{16}$	1 $\frac{7}{16}$	2	$\frac{3}{8}$	1 $\frac{3}{4}$
26	29 $\frac{1}{8}$	5	34 $\frac{1}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	2	$\frac{3}{8}$	1 $\frac{13}{16}$
28	31 $\frac{1}{4}$	5	36 $\frac{3}{8}$	1 $\frac{7}{16}$	1 $\frac{9}{16}$	2	$\frac{3}{8}$	1 $\frac{7}{8}$
30	33 $\frac{3}{8}$	5	38 $\frac{5}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$	2	$\frac{3}{8}$	1 $\frac{15}{16}$
36	39 $\frac{3}{4}$	5	45 $\frac{5}{8}$	1 $\frac{11}{16}$	1 $\frac{13}{16}$	2	$\frac{3}{8}$	2 $\frac{1}{8}$
42	46 $\frac{1}{8}$	5	52 $\frac{5}{8}$	1 $\frac{7}{8}$	2	2	$\frac{3}{8}$	2 $\frac{5}{16}$
48	52 $\frac{1}{2}$	5	59 $\frac{5}{8}$	2 $\frac{1}{16}$	2 $\frac{3}{16}$	2	$\frac{3}{8}$	2 $\frac{1}{2}$

The bowls here shown have been adopted for extra heavy valves and specials after comparison with the dimensions given by principal manufacturers of bell and spigot pipe. Considerable disparity exists in the makers' standards and we have endeavored to design a bowl which will give the least trouble from interference, yet having the proper lead space.

STANDARD FLOOR STANDS

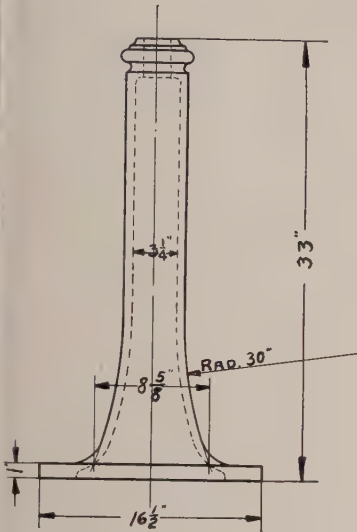


Fig. 9013
No. 1

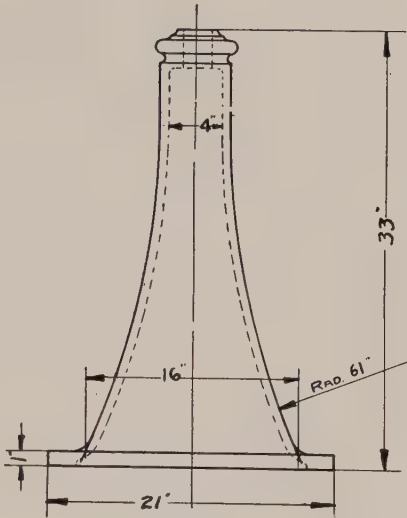


Fig. 9014
No. 2

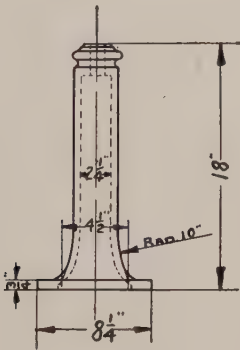
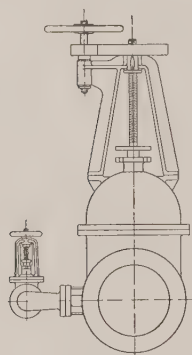


Fig. 9015
No. 3

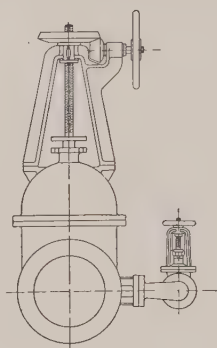
For price list, see page 358.

TYPICAL OPERATING MECHANISMS



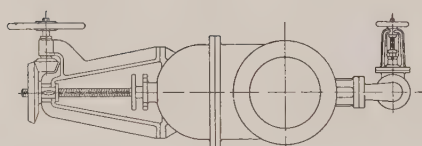
OUTSIDE SCREW
SPUR GEARED GATE VALVE

Fig. 9044



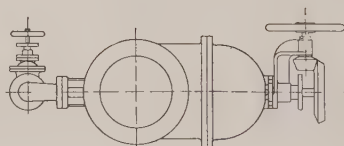
OUTSIDE SCREW
BEVEL GEARED GATE VALVE

Fig. 9045



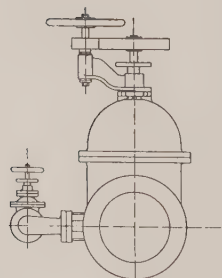
OUTSIDE SCREW,
BEVEL GEARED GATE VALVE

Fig. 9046



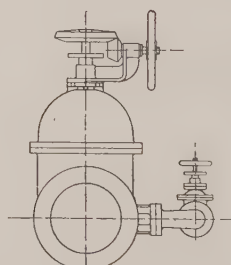
INSIDE SCREW,
BEVEL GEARED GATE VALVE

Fig. 9047



INSIDE SCREW,
SPUR GEARED GATE VALVE

Fig. 9048

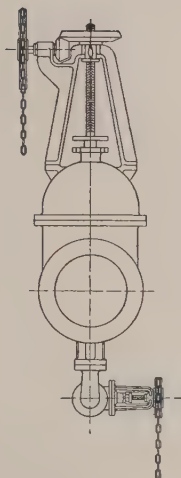


INSIDE SCREW,
BEVEL GEARED GATE VALVE

Fig. 9049

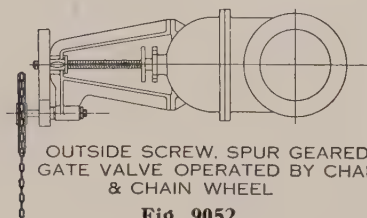
Valves Furnished with or without By-pass

TYPICAL OPERATING MECHANISMS



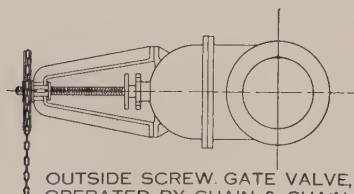
OUTSIDE SCREW, BEVEL GEARED
GATE VALVE OPERATED BY CHAIN
& CHAIN WHEEL

Fig. 9050



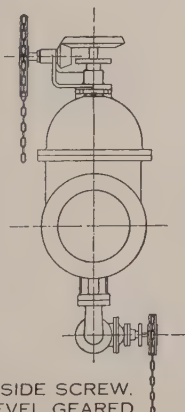
OUTSIDE SCREW, SPUR GEARED
GATE VALVE OPERATED BY CHAIN
& CHAIN WHEEL

Fig. 9052



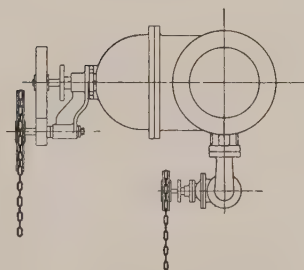
OUTSIDE SCREW, GATE VALVE,
OPERATED BY CHAIN & CHAIN
WHEEL

Fig. 9053



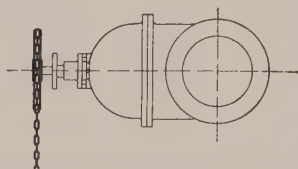
INSIDE SCREW,
BEVEL GEARED
GATE VALVE, OPERATED BY
CHAIN & CHAIN WHEEL

Fig. 9051



INSIDE SCREW, SPUR GEARED
GATE VALVE OPERATED BY CHAIN
& CHAIN WHEEL

Fig. 9054

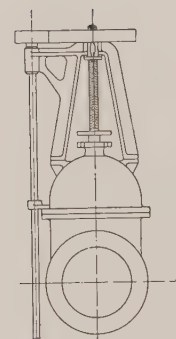


INSIDE SCREW, GATE VALVE,
OPERATED BY CHAIN & CHAIN WHEEL

Fig. 9055

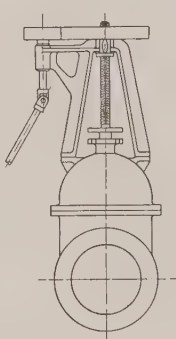
Valves Furnished with or without By-pass

TYPICAL OPERATING MECHANISMS



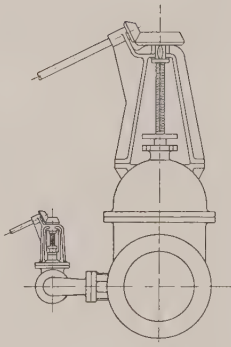
OUTSIDE SCREW, SPUR
GEARED GATE VALVE

Fig. 9056



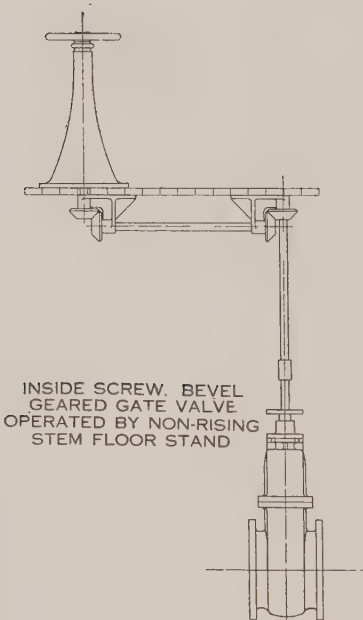
OUTSIDE SCREW, SPUR
GEARED GATE VALVE

Fig. 9057



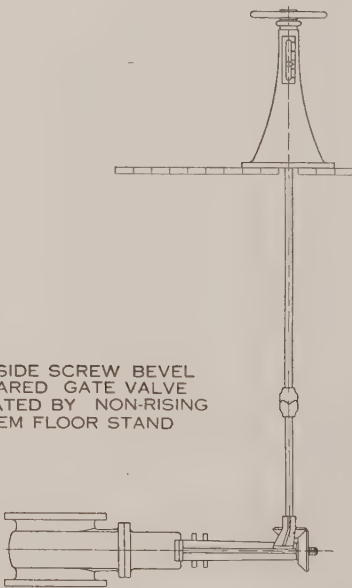
OUTSIDE SCREW, BEVEL
GEARED GATE VALVE

Fig. 9058



INSIDE SCREW, BEVEL
GEARED GATE VALVE
OPERATED BY NON-RISING
STEM FLOOR STAND

Fig. 9059

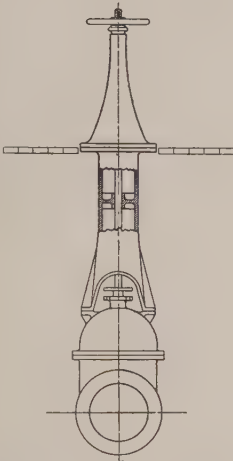


OUTSIDE SCREW BEVEL
GEARED GATE VALVE
OPERATED BY NON-RISING
STEM FLOOR STAND

Fig. 9060

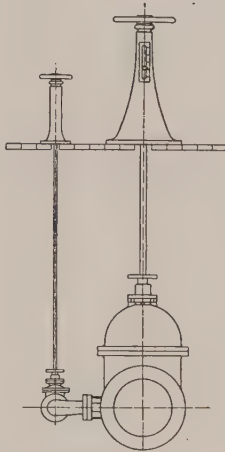
**Valves Furnished with or without By-pass
Floor Stands Furnished with or without Indicator**

TYPICAL OPERATING MECHANISMS



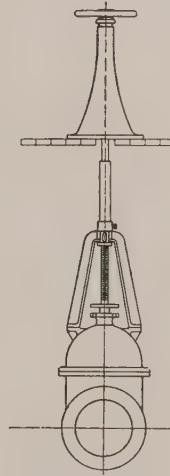
RIISING STEM GATE VALVE
WITH CONNECTING YOKE
AND FLOOR STAND

Fig. 9061



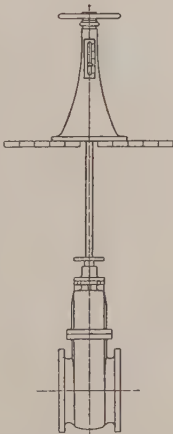
INSIDE SCREW GATE
VALVE OPERATED BY
NON-RIISING STEM
FLOOR STAND

Fig. 9062



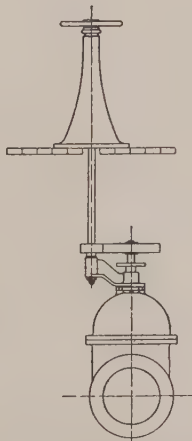
OUTSIDE SCREW GATE
VALVE WITH HOLLOW STEM
COUPLING OPERATED BY NON-
RIISING STEM FLOOR STAND

Fig. 9063



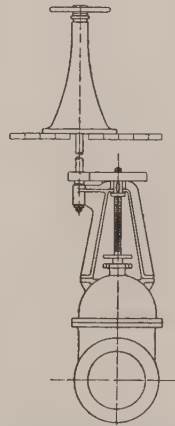
INSIDE SCREW GATE VALVE
OPERATED BY NON-RIISING
STEM FLOOR STAND

Fig. 9064



INSIDE SCREW SPUR GEARED
GATE VALVE OPERATED BY
NON-RIISING STEM
FLOOR STAND

Fig. 9065



OUTSIDE SCREW
SPUR GEARED GATE VALVE
OPERATED BY NON-RIISING
STEM FLOOR STAND

Fig. 9066

Valves Furnished with or without By-pass
Floor Stands Furnished with or without Indicator

TYPICAL OPERATING MECHANISMS

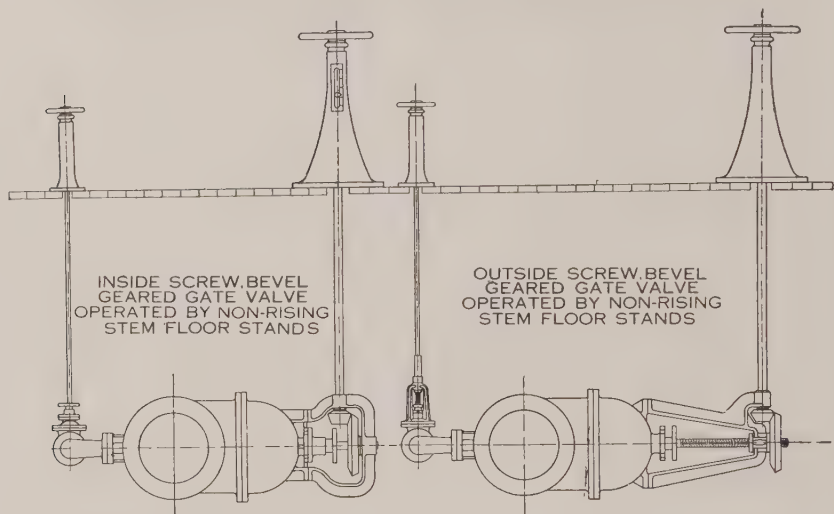


Fig. 9067

Fig. 9068

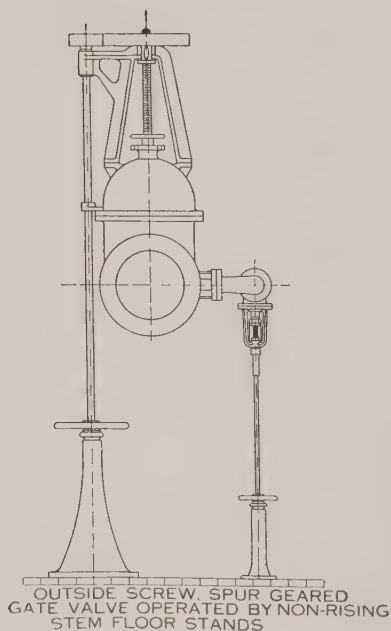


Fig. 9069

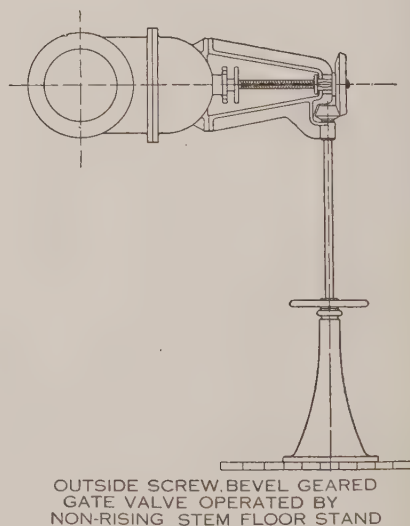


Fig. 9070

Valves Furnished with or without By-pass
Floor Stands Furnished with or without Indicator

STANDARD BASES FOR TEES
STANDARD and LONG RADIUS ELBOWS
30, 125 AND 250 POUND FITTINGS

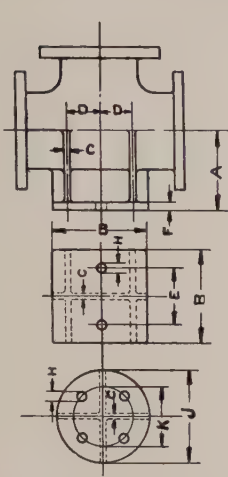


Fig. 9024

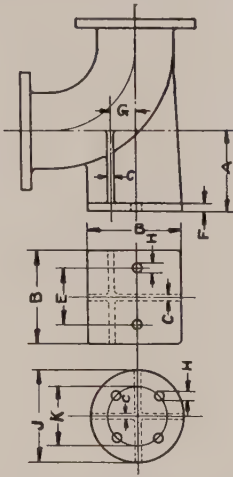


Fig. 9025

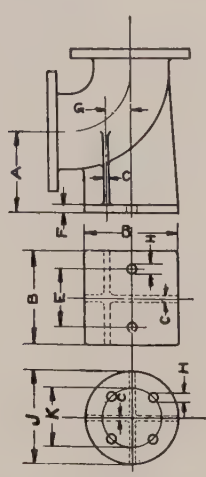


Fig. 9026

Size.....inches	3	3½	4	4½	5	6	7	8	9	10	12	14	15
A	5	5½	6	6½	7	7½	8½	9½	10	10½	12	13½	14
B	5	5	6	6	7	7	7	9	9	9	11	11	11
C	½	½	½	½	½	½	½	⅝	⅝	⅝	⅞	⅞	⅞
D	2¼	2¼	2¾	2¾	3¼	3¼	3¼	3¼	3¼	3¼	4	4	4
E	3⅞	3⅞	4¾	4¾	5½	5½	5½	7½	7½	7½	9½	9½	9½
F	⅞	⅞	⅝	⅝	⅞	⅞	⅞	1⅞	1⅞	1⅞	1	1	1
G	1	1	1	1	1	1	1	1⅞	1⅞	1⅞	1¼	1¼	1¼
H	⅝	⅝	¾	¾	¾	¾	¾	⅞	⅞	⅞	⅞	⅞	⅞
J	5	5	6	6	7	7	9	9	9	9	11	11	11
K	3⅞	3⅞	4¾	4¾	5½	5½	5½	7½	7½	7½	9½	9½	9½
Size of Stanchion for Round Bases.....	1½	1½	2	2	2½	2½	2½	4	4	4	6	6	6

Size.....inches	16	18	20	22	24	26	28	30	32	36	42	48	..
A	14½	16	17	18	19½	20½	22	23	25	27	30	34	..
B	11	13½	13½	16	16	16	20	20	24	24	24	28	..
C	⅞	¾	¾	¾	¾	⅞	⅞	⅞	⅞	⅞	1	1	..
D	4	5	5	5	5	5	5	5	5	5	5	5	..
E	9½	11¾	11¾	14¼	14¼	14¼	18¼	18¼	22¼	22¼	22¼	26	..
F	1	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1¼	1¼	..
G	1¼	1⅞	1⅞	1⅞	1⅞	1½	1½	1½	1½	1½	1⅞	1⅞	..
H	⅞	⅞	⅞	⅞	⅞	1	1	1	1	1	1	1	..
J	11	13½	13½	13½	13½	16	16	16	16	16	19	19	..
K	9½	11¾	11¾	11¾	11¾	14¼	14¼	14¼	14¼	14¼	17	17	..
Size of Stanchion for Round Bases.....	6	8	8	8	8	10	10	10	10	10	12	12	..

NOTE.—Diameter and drilling of Round Bases correspond with standard flanges.
For price lists, see pages 74, 103, 169, and 213.

PLAIN ROLLER SUPPORTS

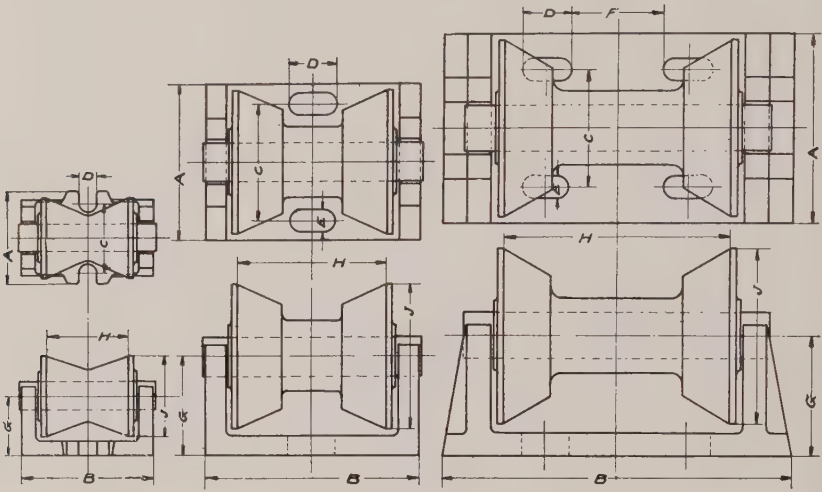


Fig. 9009
1 1/2"–8", inclusive

Fig. 9010
9"–12" inclusive

Fig. 9011
14"–30" inclusive

K = Distance from center line of pipe to base of support

Size.. inches	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8	9
A	4	4	4	4	4	4	4	4	4	4	4	6 3/4
B	3 1/2	3 1/2	3 1/2	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8	9
C	3	3	3	3	3	3	3	3	3	3	3	5
D	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	2
E	...	...	...	...	...	...	...	...	...	...	...	7/8
F	...	...	...	...	...	...	...	...	...	...	...	...
G	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	4 1/4
H	2	2	2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	6 1/4
J	2 11/16	2 11/16	2 11/16	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	6 5/16
K	4	4 1/4	4 9/16	5 9/16	5 3/16	6 1/8	6 3/8	6 11/16	7 1/4	7 13/16	8 5/16	11 1/4

Size.. inches	10	12	14	15	16	18	20	22	24	26	28	30
A	6 3/4	6 3/4	7	7	7	7 1/2	7 1/2	7 1/2	7 1/2	8	8	8
B	9	9	12 1/2	12 1/2	12 1/2	16	16	16	16	19	19	19
C	5	5	5	5	5	5	5	5	5	5 1/2	5 1/2	5 1/2
D	2	2	2	2	2	2	2	2	2	2	2	2
E	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1	1	1
F	...	...	4	4	4	6	6	6	6	6	6	6
G	4 1/4	4 1/4	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8	5 3/4	5 3/4	5 3/4
H	6 1/4	6 1/4	9 1/2	9 1/2	9 1/2	11	11	11	11	12 1/2	12 1/2	12 1/2
J	6 5/16	6 5/16	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	8	8	8
K	11 7/8	13	14 3/16	14 3/4	15 3/8	16 3/16	17 1/16	18 1/2	19 5/8	21 7/16	22 1/2	23 5/8

For price list, see page 354.

ADJUSTABLE ROLLER SUPPORTS

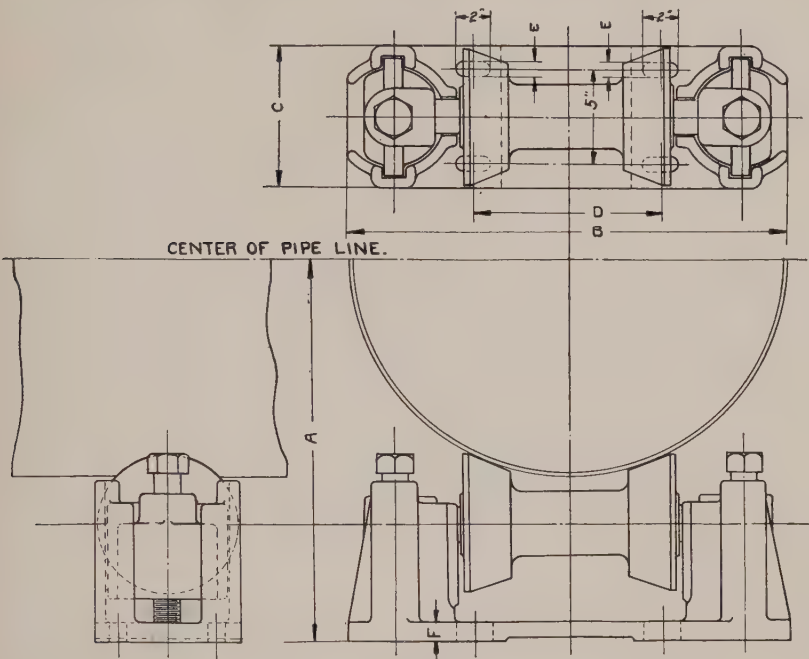


Fig. 9027

Size.....inches	3	3½	4	4½	5	6	7	8	9
A	8½	8¾	9	9¼	9½	10⅛	10¾	11¼	12⅞
B	12⅞	12⅞	12⅞	12⅞	12⅞	12⅞	12⅞	12⅞	15⅝
C	6¼	6¼	6¼	6¼	6¼	6¼	6¼	6¼	7
D	4¾	4¾	4¾	4¾	4¾	4¾	4¾	4¾	6¾
E	¾	¾	¾	¾	¾	¾	¾	¾	⅞
F	¾	¾	¾	¾	¾	¾	¾	¾	⅞

Size.....inches	10	12	14	15	16	18	20	22	24
A	13⅝	14¾	15¾	16⅝	17	18	19⅛	20¼	21½
B	15⅝	15⅝	21½	21½	21½	24	24	24	24
C	7	7	7½	7½	7½	7¾	7¾	7¾	7¾
D	6¾	6¾	9½	9½	9½	11	11	11	11
E	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞	⅞
F	⅞	⅞	1	1	1	1	1	1	1

For price list, see page 355.

STANDARD STANCHIONS

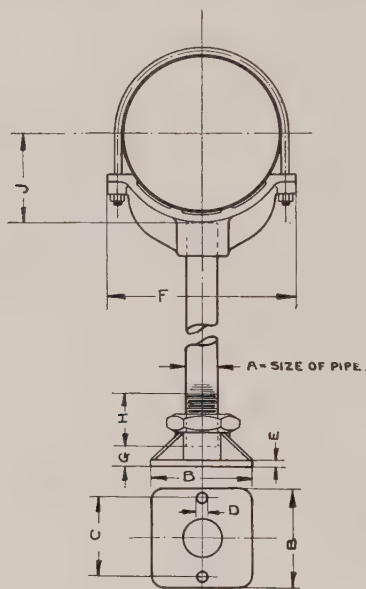
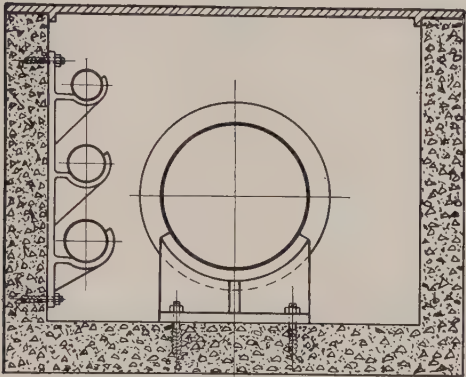


Fig. 9028

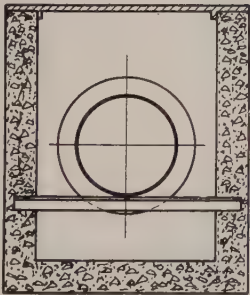
Size of Pipe Supported Inches	12 Feet High or Less									More Than 12 Feet High								
	A	B	C	D	E	F	G	H	J	A	B	C	D	E	F	G	H	J
4	2	7	5½	¾	⅝	6⅞	1⅜	5¼	2¾	2½	8½	7	¾	⅝	6⅞	1⅝	5¾	2¾
4½	2	7	5½	¾	⅝	7⅜	1⅜	5¼	3	2½	8½	7	¾	⅝	7⅜	1⅝	5¾	3
5	2½	8½	7	¾	⅝	8	1⅝	5¼	3⅞	3	10	8	⅞	⅞	8	1¾	6¼	3⅞
6	2½	8½	7	¾	⅝	9	1⅝	5¼	3⅞	3	10	8	⅞	⅞	9	1¾	6¼	3⅞
7	2½	8½	7	¾	⅝	10	1⅝	5¼	4½	3	10	8	⅞	⅞	10	1¾	6¼	4½
8	2½	8½	7	¾	⅝	11	1⅝	5¼	5	3	10	8	⅞	⅞	11	1¾	6¼	5
9	2½	8½	7	¾	⅝	12⅜	1⅝	5¼	5⅝	3	10	8	⅞	⅞	12⅜	1¾	6¼	5⅝
10	2½	8½	7	¾	⅝	13½	1⅝	5¼	6⅞	3	10	8	⅞	⅞	13½	1¾	6¼	6⅞
12	2½	8½	7	¾	⅝	15½	1⅝	5¼	7¼	3	10	8	⅞	⅞	15½	1¾	6¼	7¼
14	3	10	8	⅞	⅞	16¾	1¾	6¼	7⅞	4	11	9	⅞	¾	16¾	1⅞	6¾	7⅞
15	3	10	8	⅞	⅞	17¾	1¾	6¼	8⅜	4	11	9	⅞	¾	17¾	1⅞	6¾	8⅜
16	3	10	8	⅞	⅞	19⅞	1¾	6¼	8⅞	4	11	9	⅞	¾	19⅞	1⅞	6¾	8⅞
18	3	10	8	⅞	⅞	21⅞	1¾	6¼	10	4	11	9	⅞	¾	21⅞	1⅞	6¾	10
20	4	11	9	⅞	¾	23⅞	1⅞	6¾	11⅞	5	12½	10	1	⅞	23⅞	2⅞	7¼	11⅞
22	4	11	9	⅞	¾	25½	1⅞	6¾	12¼	5	12½	10	1	⅞	25½	2⅞	7¼	12¼
24	4	11	9	⅞	¾	27½	1⅞	6¾	13¼	5	12½	10	1	⅞	27½	2⅞	7¼	13¼
30	5	12½	10	1	⅞	34	2⅞	7¼	16½	6	14	11½	1	1	34	2⅞	8	16½

For price list, see page 356.

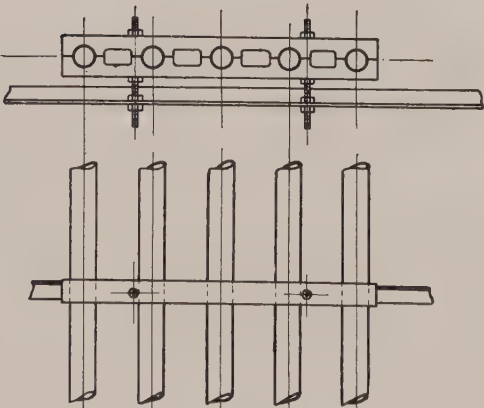
TYPICAL METHODS OF SUPPORTING
PIPE



TRENCH SUPPORTS.

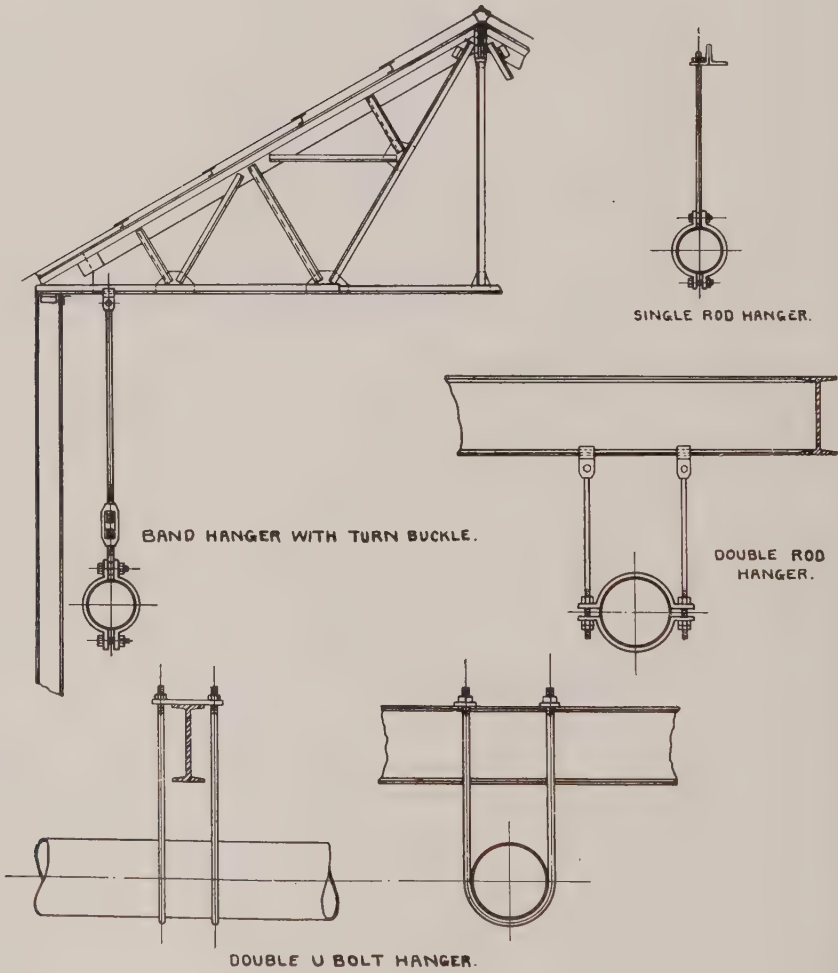


CONCRETE TRENCH.

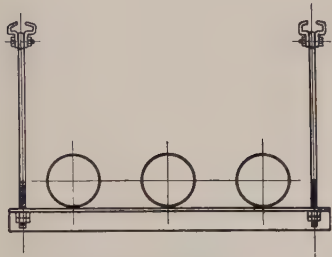


COIL SUPPORT.

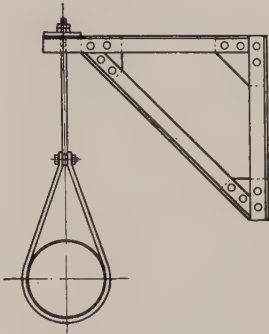
TYPICAL METHODS OF SUPPORTING
PIPE



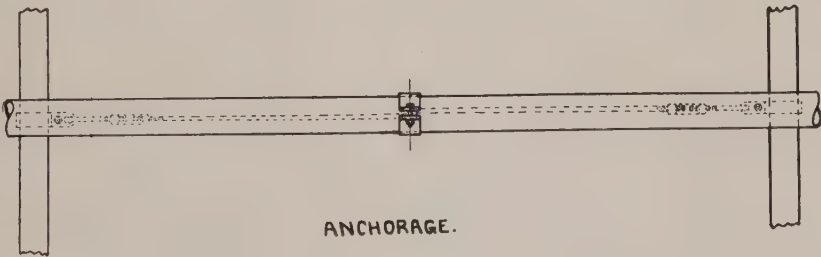
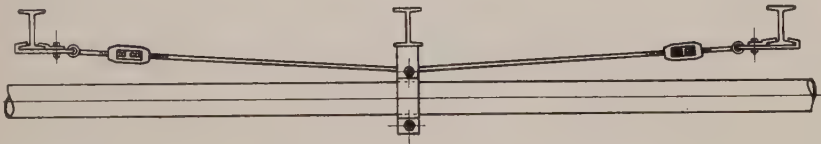
TYPICAL METHODS OF SUPPORTING
AND ANCHORING PIPE



ANGLE IRON HANGER.

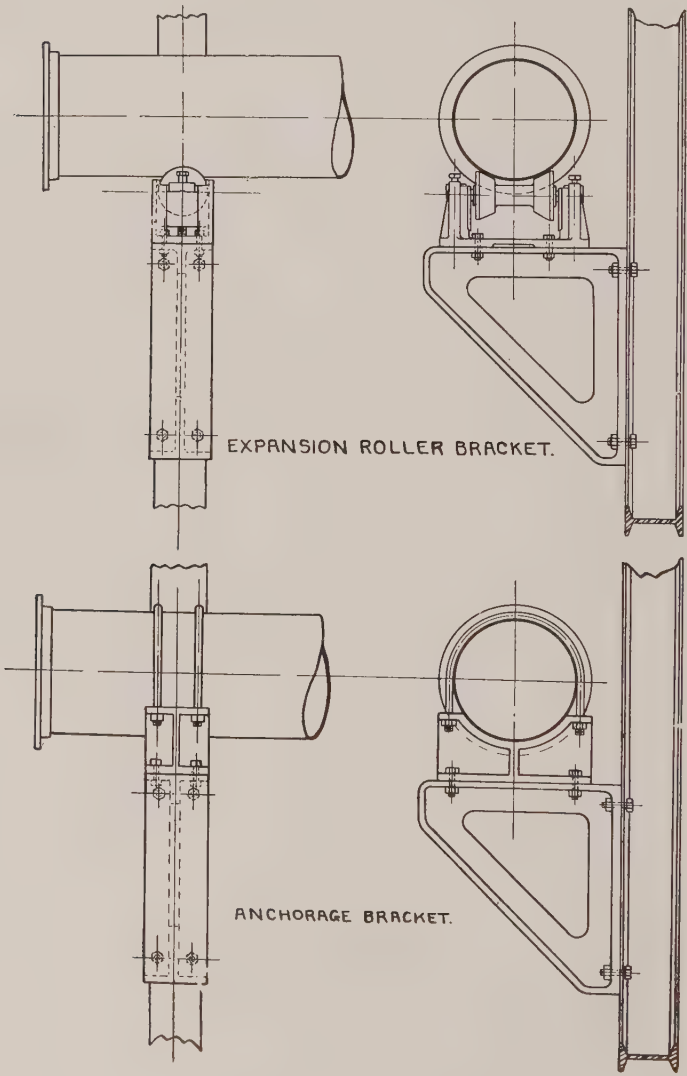


STRUCTURAL BRACKET & HANGER

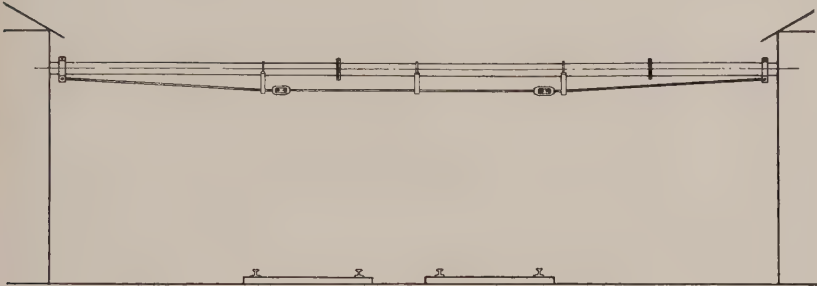


ANCHORAGE.

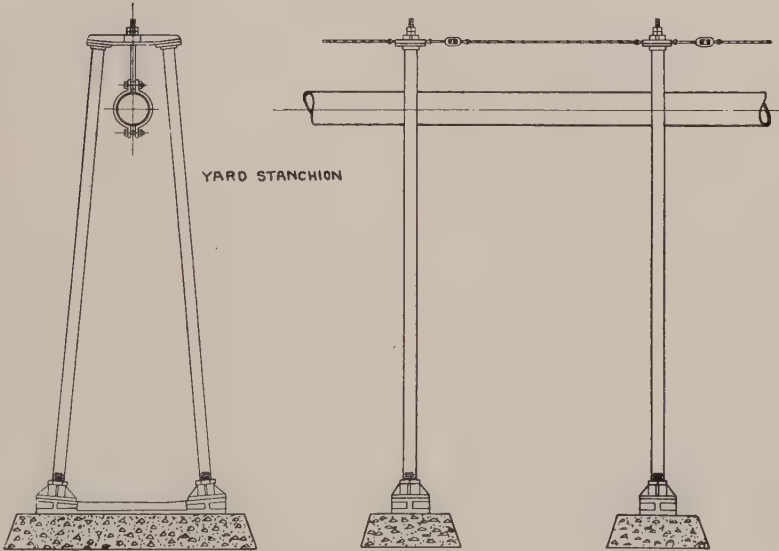
**TYPICAL METHODS OF SUPPORTING
AND ANCHORING PIPE**



TYPICAL METHOD OF SUPPORTING
PIPE

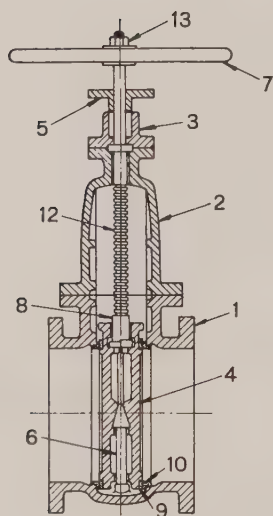


HOG ROD SUPPORT.

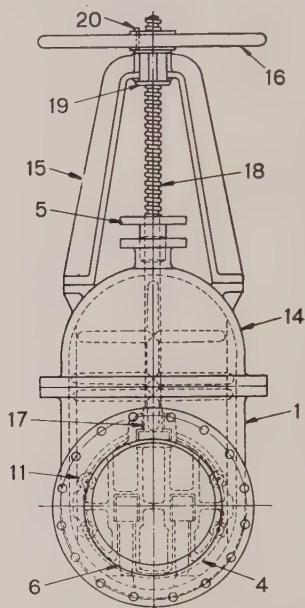


HOG ROD & OUT SIDE STANCHION.

REPAIR PARTS FOR PARALLEL SEAT GATE VALVES



INSIDE SCREW VALVE

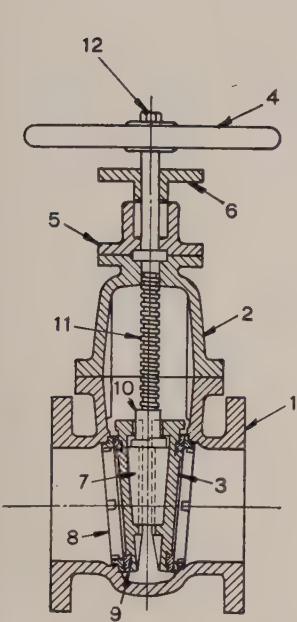


OUTSIDE SCREW VALVE

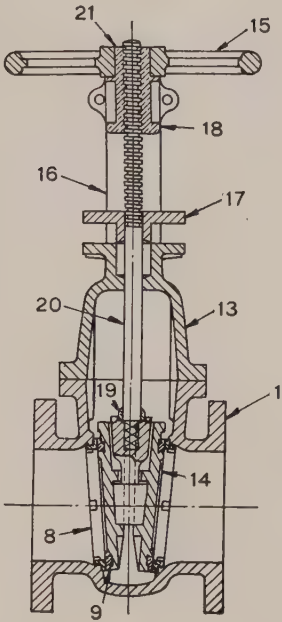
No. Req'd.	Name	Mark	No. Req'd.	Name	Mark
1	Body	1	1	Body	1
1	Top	2	1	Top	14
1	Stuffing Box	3	1	Arch	15
2	Discs	4	2	Discs	4
1	Gland	5	1	Gland	5
1 or 2	Wedges	6	1 or 2	Wedges	6
1	Handwheel	7	1	Handwheel	16
1	Disc Nut	8	1	Disc Nut	17
2	Disc Rings	9	2	Disc Rings	9
2	Seats	10	2	Seats	10
2 or 4	Rollers	11	2 or 4	Rollers	11
1	Stem	12	1	Stem	18
1	Hex. Nut	13	1	Arch Nut	19
			1	Key	20

When ordering parts specify pressure and size of valve.

REPAIR PARTS FOR TAPER SEAT
STEAM GATE VALVES



INSIDE SCREW VALVE



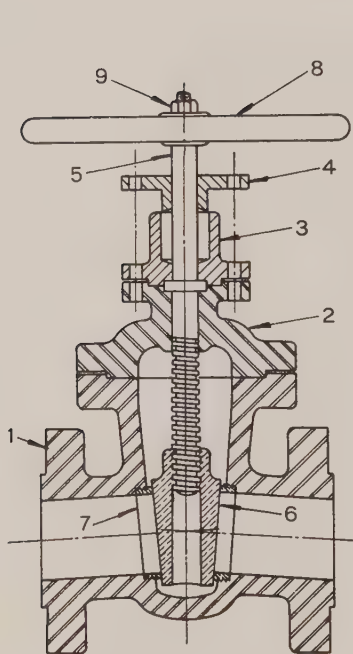
OUTSIDE SCREW & YOKE VALVE

No. Req'd	Name	Mark
1	Body	1
1	Top	2
2	Discs	3
1	Handwheel	4
1	Stuffing Box	5
1	Gland	6
1	Wedge	7
2	Seat Rings	8
2	Disc Rings	9
1	Disc Nut	10
1	Stem	11
1	Nut for Handwheel	12

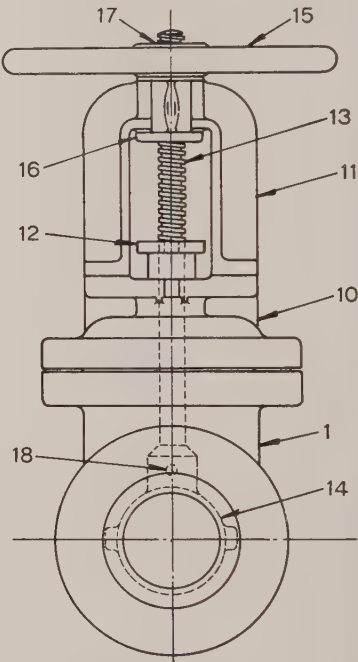
No. Req'd	Name	Mark
1	Body	1
1	Top	13
2	Discs	14
1	Handwheel	15
1	Arch	16
1	Gland	17
1	Arch Nut	18
2	Seat Rings	8
2	Disc Rings	9
1	Packing Ring	19
1	Stem with Cast-in Wedge	20
1	Key for Handwheel	21

When ordering parts specify pressure and size of valve.

REPAIR PARTS FOR HYDRAULIC
TAPER SEAT GATE VALVES



INSIDE SCREW VALVE



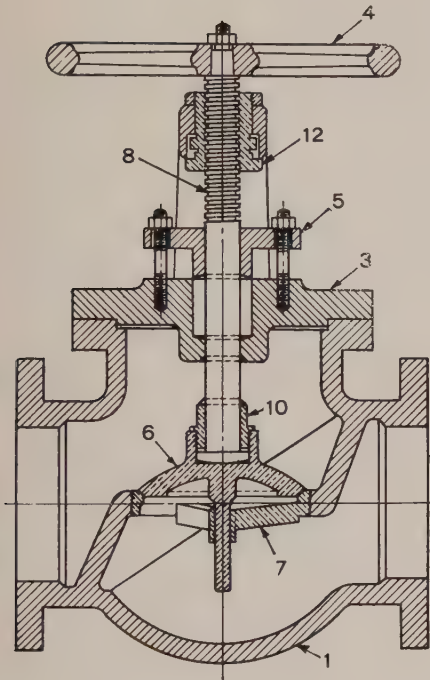
OUTSIDE SCREW & YOKE VALVE

No. Req'd	Name	Mark
1	Body	1
1	Top	2
1	Stuffing Box	3
1	Gland	4
1	Stem	5
1	Disc	6
2	Seats	7
1	Handwheel	8
1	Nut for Handwheel	9

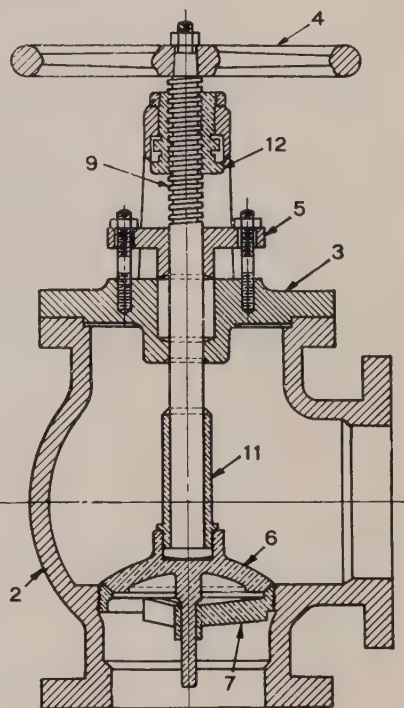
No. Req'd	Name	Mark
1	Body	1
1	Top	10
1	Arch	11
1	Gland	12
1	Stem	13
1	Disc	14
2	Seats	7
1	Handwheel	15
1	Arch Nut	16
1	Key for Handwheel	17
1	Pin for Disc	18

When ordering parts specify pressure and size of valve.

REPAIR PARTS FOR GLOBE AND
ANGLE VALVES



GLOBE



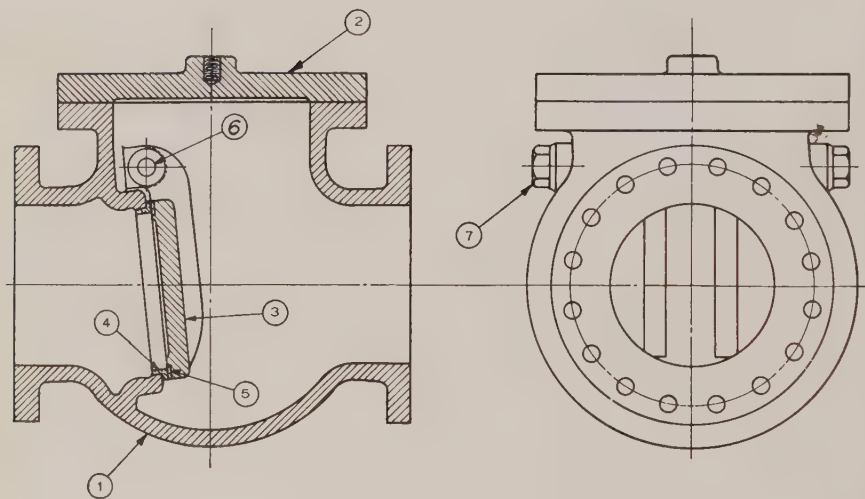
ANGLE

No. Req'd	Name	Mark
1	Body	1
1	Top	3
1	Handwheel	4
1	Gland	5
1	Disc	6
1	Seat	7
1	Stem	8
1	Sleeve	10
1	Arch Nut	12

No. Req'd	Name	Mark
1	Body	2
1	Top	3
1	Handwheel	4
1	Gland	5
1	Disc	6
1	Seat	7
1	Stem	9
1	Sleeve	11
1	Arch Nut	12

When ordering parts specify pressure and size of valve.

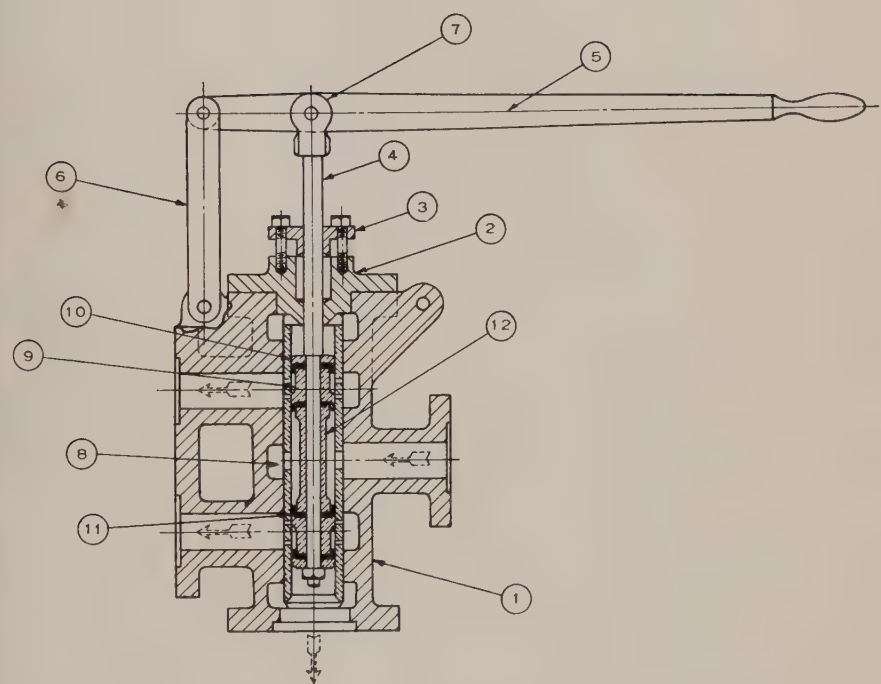
REPAIR PARTS FOR SWING CHECK VALVES



No. Req'd	Name	Mark
1	Body	1
1	Cover	2
1	Disc	3
1	Seat	4
1	Disc Ring	5
1	Shaft	6
2	Plugs	7

When ordering parts specify pressure and size of valve.

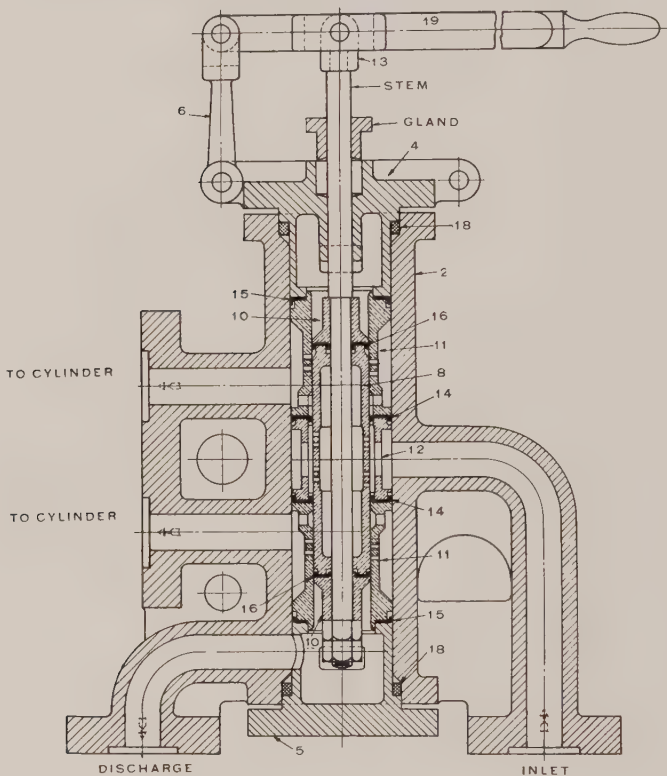
REPAIR PARTS FOR CRITCHLOW VALVES



No. Req.	Name	Mark	No. Req.	Name	Mark
1	Body	1	1	Clevis	7
1	Top	2	1	Bushing	8
1	Gland	3	2	End Spools	9
1	Stem	4	2	Washers	10
1	Lever	5	4	Leather Cups	11
1	Link	6	1	Center Spool	12

When ordering parts specify size of valve.

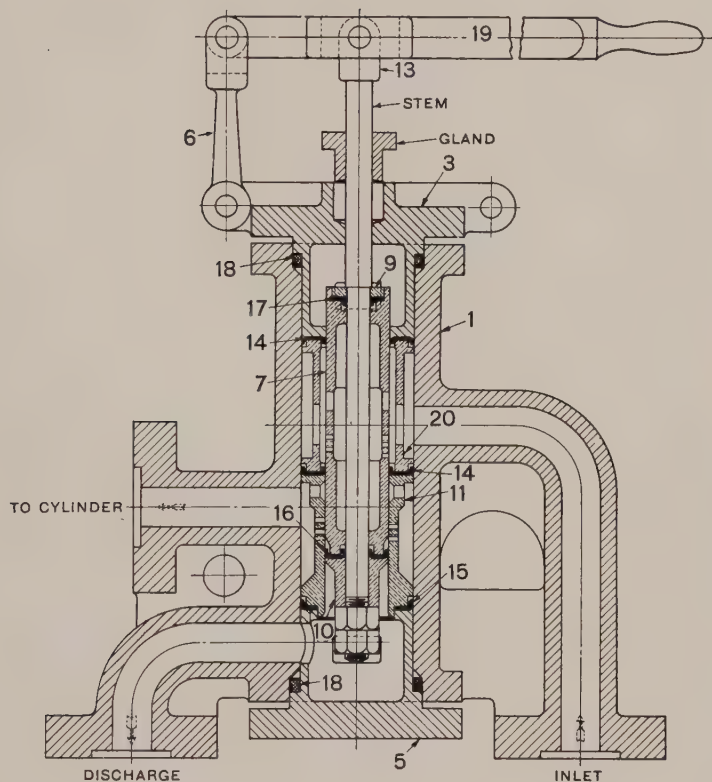
REPAIR PARTS FOR FOUR-WAY
TANNER OPERATING VALVES



No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	2	1	Center piece	12
1	Top Cap	4	1	Stem Head	13
1	Bottom Cap	5	1	Stem	
1	Gland		2	Leather Cups	14
1	Link	6	2	Leather Cups	15
1	Plunger	8	2	Leather Cups	16
2	End Washers	10	2	Rubber rings	18
2	Bushings	11	1	Lever	19

When ordering parts specify size of valve.

REPAIR PARTS FOR THREE-WAY TANNER OPERATING VALVES

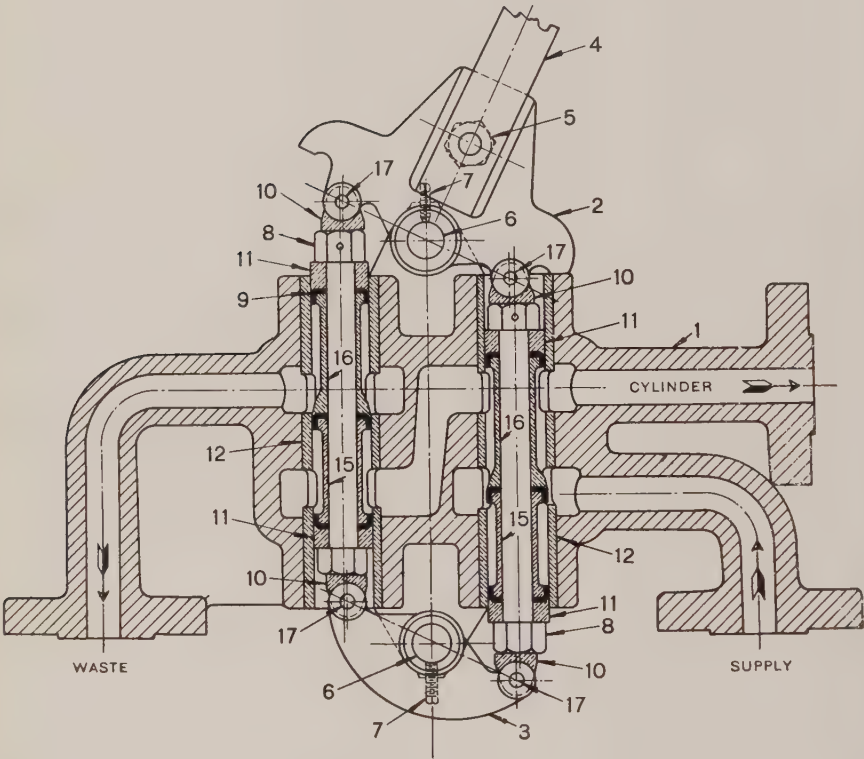


No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	1	1	Center piece	20
1	Top Cap	3	1	Stem Head	13
1	Bottom Cap	5	1	Stem	
1	Gland		2	Leather Cups	14
1	Link	6	1	Leather Cup	15
1	Plunger	7	1	Leather Cup	16
1	Plunger Cap	9	1	Leather Cup	17
1	End Washer	10	2	Rubber rings	18
1	Bushing	11	1	Lever	19

When ordering parts specify size of valve.

REPAIR PARTS FOR THREE-WAY
AIKEN OPERATING VALVES

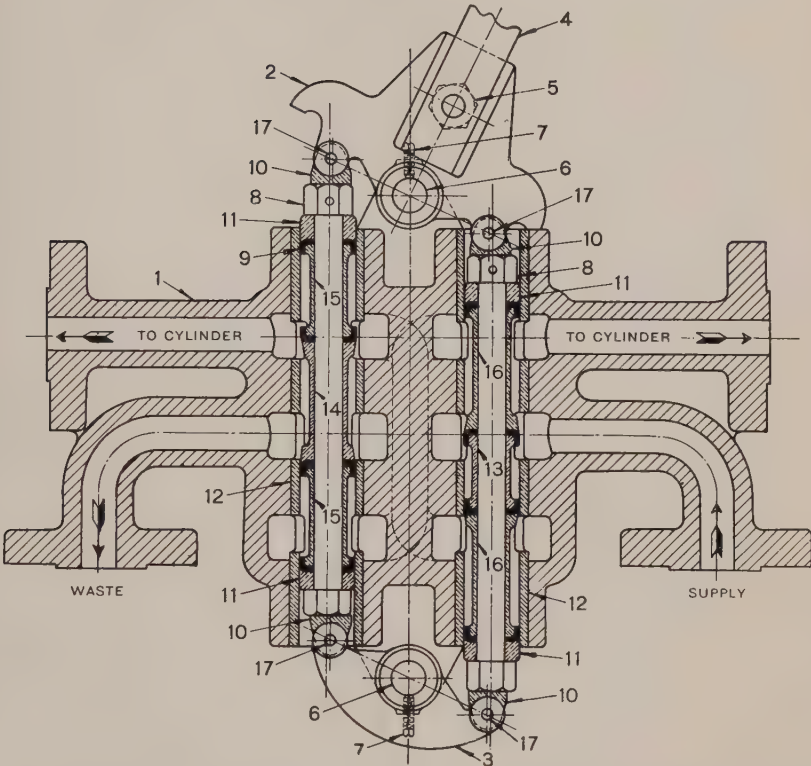
SEMI-STEEL BODY



No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	1	6	Leather Cups	9
1	Walking Beam	2	4	Slippers	10
1	Walking Beam	3	4	Washers	11
1	Lever	4	2	Bushings	12
1	Bolt with Hex. Nut	5	2	Spools	15
2	Pins	6	2	Spools	16
2	Set Screws	7	4	Slipper Pins	17
2	Bolts with Hex. Nut	8			

When ordering parts specify size of valve.

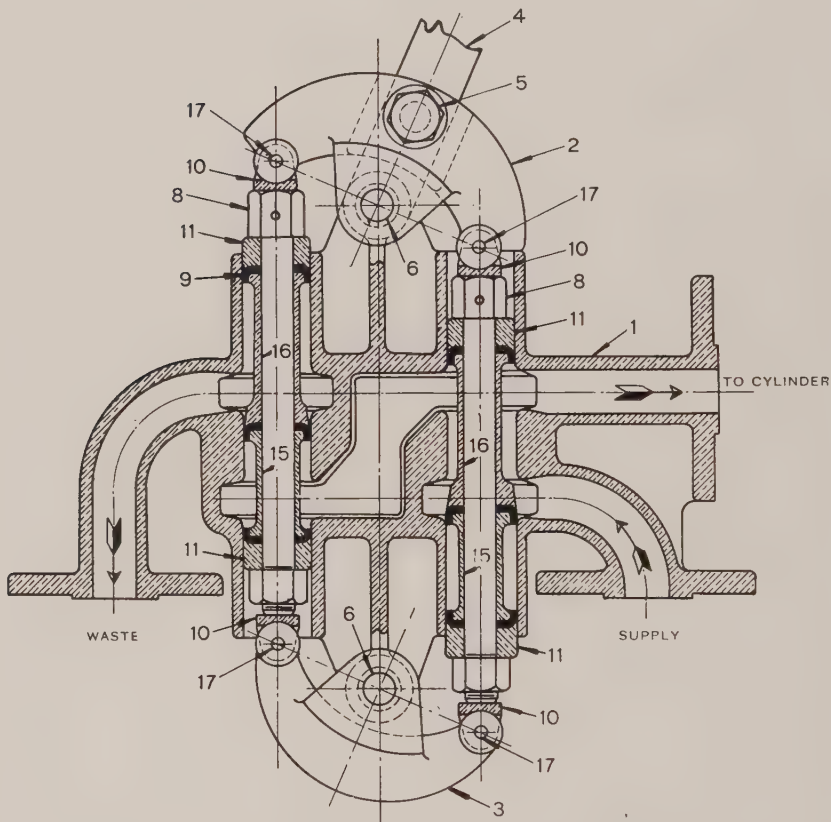
REPAIR PARTS FOR FOUR-WAY
AIKEN OPERATING VALVES
SEMI-STEEL BODY



No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	1	4	Slippers	10
1	Walking Beam	2	4	Washers	11
1	Walking Beam	3	2	Bushings	12
1	Lever	4	1	Spool	13
1	Bolt with Hex. Nut	5	1	Spool	14
2	Pins	6	2	Spools	15
2	Set Screws	7	2	Spools	16
2	Bolts with Hex. Nut	8	4	Slipper Pins	17
8	Leather Cups	9			

When ordering parts specify size of valve.

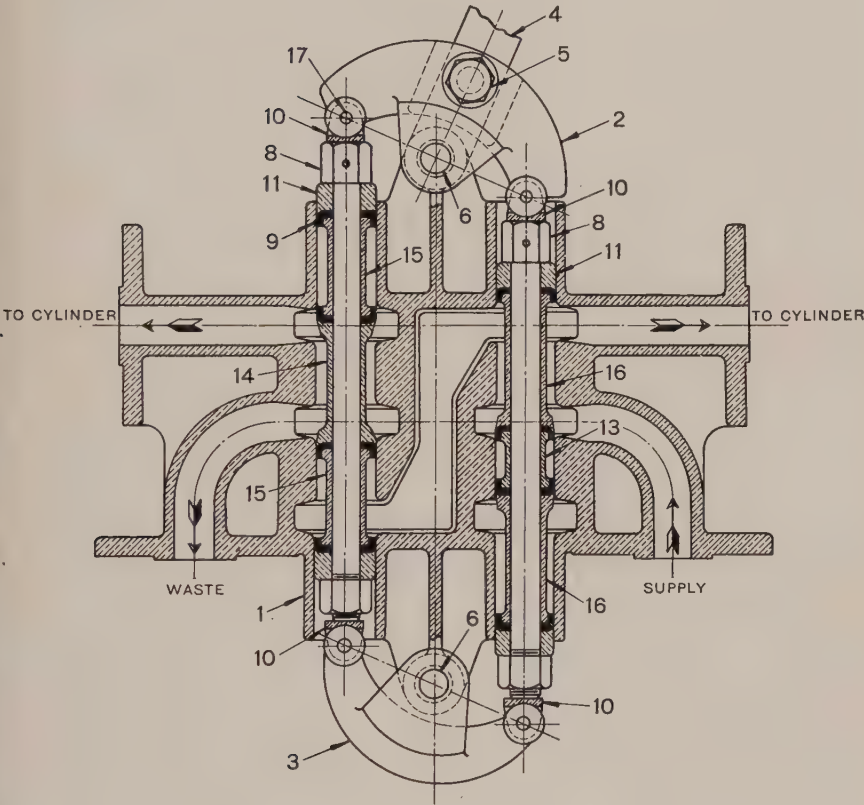
REPAIR PARTS FOR THREE-WAY
AIKEN OPERATING VALVES
BRONZE BODY



No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	1	6	Leather Cups	9
1	Walking Beam	2	4	Slippers	10
1	Walking Beam	3	4	Washers	11
1	Lever	4	2	Spools	15
1	Bolt with Hex. Nut	5	2	Spools	16
2	Pins	6	4	Slipper Pins	17
2	Bolts with Hex. Nut	8			

When ordering parts specify size of valve.

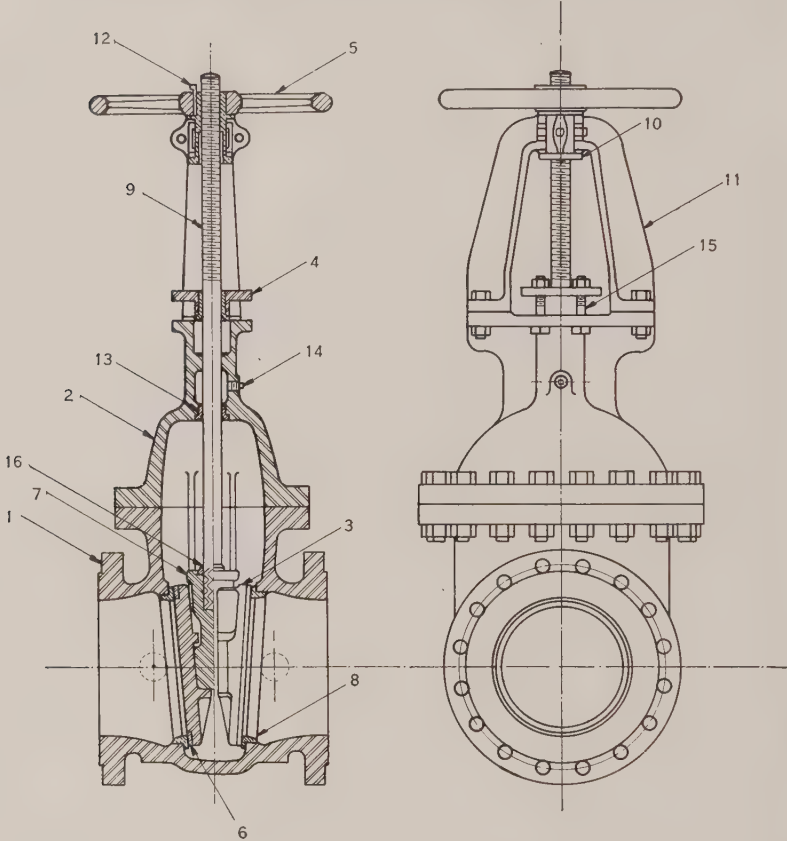
REPAIR PARTS FOR FOUR-WAY
AIKEN OPERATING VALVES
BRONZE BODY



No. Req'd	Name	Mark	No. Req'd	Name	Mark
1	Body	1	4	Slippers	10
1	Walking Beam	2	4	Washers	11
1	Walking Beam	3	1	Spool	13
1	Lever	4	1	Spool	14
1	Bolt with Hex. Nut	5	2	Spools	15
2	Pins	6	2	Spools	16
2	Bolts with Hex. Nut	8	4	Slipper Pins	17
8	Leather Cups	9			

When ordering parts specify size of valve.

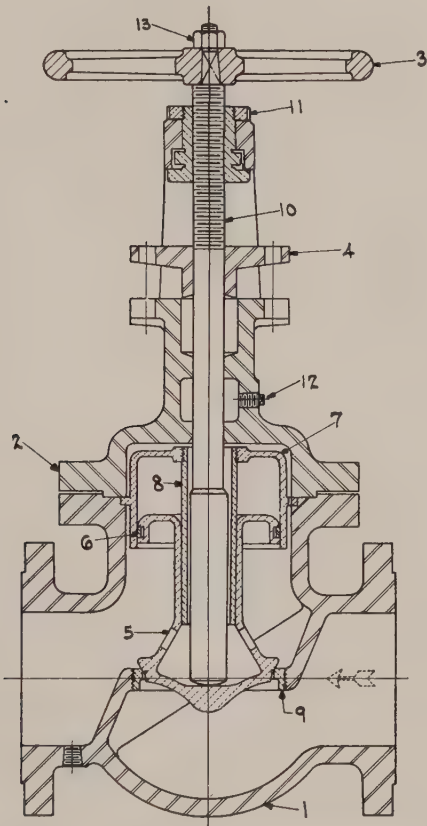
REPAIR PARTS FOR SUPERHEATED
STEAM GATE VALVES No. 4 S



No. Req'd.	Name	Mark	No. Req'd.	Name	Mark
1	Body	1	1	Arch Nut	10
1	Top	2	1	Arch	11
2	Discs	3	1	Key	12
1	Gland	4	1	Bushing	13
1	Handwheel	5	1	Plug	14
2	Disc Rings	6	2 or 4	Gland Bolts	15
1	Disc Nut	7	1	Packing Ring	16
2	Seats	8			
1	Stem	9			

When ordering parts specify size of valve.

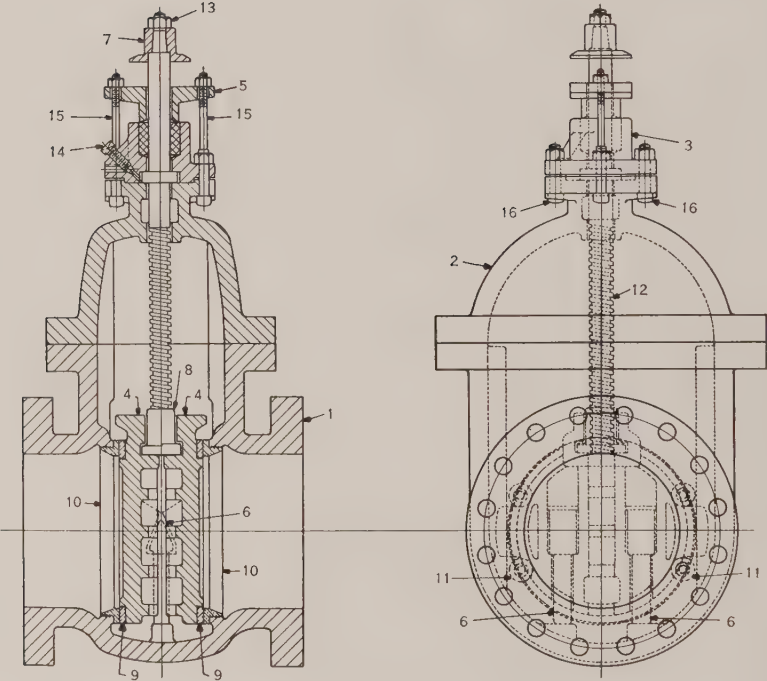
**REPAIR PARTS FOR ATWOOD
NON-RETURN (STOP AND CHECK)
VALVES**



No. Req'd.	Name	Mark	No. Req'd.	Name	Mark
1	Body	1	1	Disc Guide Sleeve	8
1	Top with Arch	2	1	Seat	9
1	Handwheel	3	1	Stem	10
1	Gland	4	1	Arch Nut	11
1	Disc	5	1	Pipe Plug	12
1	Piston Ring	6	1	Nut for Handwheel	13
1	Disc Guide	7			

When ordering parts, specify pressure and type of valve, i. e., angle, globe or vertical, also size of valve.

REPAIR PARTS FOR
GAS LINE GATE VALVES



No. Req'd.	Name	Mark	No. Req'd.	Name	Mark
1	Body	1	2	Disc Rings	9
1	Top	2	2	Seats	10
1	Stuffing Box	3	2 or 4	Rollers	11
2	Discs	4	1	Stem	12
1	Gland	5	1	Hex. Nut	13
1 or 2	Wedges	6	1	Repacking Plug	14
1	Gate Square	7	2	Gland Bolts	15
1	Disc Nut	8	2	Stuffing Box Bolts	16

When ordering parts specify size of valve and pressure.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Properties of Saturated Steam

(Condensed by Kent from Marks and Davis's Steam Tables.)

Vacuum, inches of mercury	Absolute pressure, pounds per square inch	Temperature, Fahrenheit	Total heat above 32° F.		Latent heat $L = H - h$, heat-units	Volume, cubic feet in 1 pound of steam	Weight of 1 cubic foot steam, pound	Entropy of the water	Entropy of evaporation
			In the water h , heat-units	In the steam H , heat-units					
29.74	0.0886	32	0.00	1073.4	1073.4	3294.	0.000304	0.0000	2.1832
29.67	0.1217	40	8.05	1076.9	1068.9	2438.	0.000410	0.0162	2.1394
29.56	0.1780	50	18.08	1081.4	1063.3	1702.	0.000587	0.0361	2.0865
29.40	0.2562	60	28.08	1085.9	1057.8	1208.	0.000828	0.0555	2.0358
29.18	0.3626	70	38.06	1090.3	1052.3	871.	0.001148	0.0745	1.9868
28.89	0.505	80	48.03	1094.8	1046.7	636.8	0.001570	0.0932	1.9398
28.50	0.696	90	58.00	1099.2	1041.2	469.3	0.002131	0.1114	1.8944
28.00	0.946	100	67.97	1103.6	1035.6	350.8	0.002851	0.1295	1.8505
27.88	1	101.83	69.8	1104.4	1034.6	333.0	0.00300	0.1327	1.8427
25.85	2	126.15	94.0	1115.0	1021.0	173.5	0.00576	0.1749	1.7431
23.81	3	141.52	109.4	1121.6	1012.3	118.5	0.00845	0.2008	1.6840
21.78	4	153.01	120.9	1126.5	1005.7	90.5	0.01107	0.2198	1.6416
19.74	5	162.28	130.1	1130.5	1000.3	73.33	0.01364	0.2348	1.6084
17.70	6	170.06	137.9	1133.7	995.8	61.89	0.01616	0.2471	1.5814
15.67	7	176.85	144.7	1136.5	991.8	53.56	0.01867	0.2579	1.5582
13.63	8	182.86	150.8	1139.0	988.2	47.27	0.02115	0.2673	1.5380
11.60	9	188.27	156.2	1141.1	985.0	42.36	0.02361	0.2756	1.5202
9.56	10	193.22	161.1	1143.1	982.0	38.38	0.02606	0.2832	1.5042
7.52	11	197.75	165.7	1144.9	979.2	35.10	0.02849	0.2902	1.4895
5.49	12	201.96	169.9	1146.5	976.6	32.36	0.03090	0.2967	1.4760
3.45	13	205.87	173.8	1148.0	974.2	30.03	0.03330	0.3025	1.4639
1.42	14	209.55	177.5	1149.4	971.9	28.02	0.03569	0.3081	1.4523
Lbs. gage	14.70	212.0	180.0	1150.4	970.4	26.79	0.03732	0.3118	1.4447
0.3	15	213.0	181.0	1150.7	969.7	26.27	0.03806	0.3133	1.4416
1.3	16	216.3	184.4	1152.0	967.6	24.79	0.04042	0.3183	1.4311
2.3	17	219.4	187.5	1153.1	965.6	23.38	0.04277	0.3229	1.4215
3.3	18	222.4	190.5	1154.2	963.7	22.16	0.04512	0.3273	1.4127
4.3	19	225.2	193.4	1155.2	961.8	21.07	0.04746	0.3315	1.4045
5.3	20	228.0	196.1	1156.2	960.0	20.08	0.04980	0.3355	1.3965
6.3	21	230.6	198.8	1157.1	958.3	19.18	0.05213	0.3393	1.3887
7.3	22	233.1	201.3	1158.0	956.7	18.37	0.05445	0.3430	1.3811
8.3	23	235.5	203.8	1158.8	955.1	17.62	0.05676	0.3465	1.3739
9.3	24	237.8	206.1	1159.6	953.5	16.93	0.05907	0.3499	1.3670
10.3	25	240.1	208.4	1160.4	952.0	16.30	0.0614	0.3532	1.3604
11.3	26	242.2	210.6	1161.2	950.6	15.72	0.0636	0.3564	1.3542
12.3	27	244.4	212.7	1161.9	949.2	15.18	0.0659	0.3594	1.3483
13.3	28	246.4	214.8	1162.6	947.8	14.67	0.0682	0.3623	1.3425
14.3	29	248.4	216.8	1163.2	946.4	14.19	0.0705	0.3652	1.3367
15.3	30	250.3	218.8	1163.9	945.1	13.74	0.0728	0.3680	1.3311
16.3	31	252.2	220.7	1164.5	943.8	13.32	0.0751	0.3707	1.3257

Properties of Saturated Steam (Continued)
(Condensed by Kent from Marks and Davis's Steam Tables.)

Gage pressure, pounds per square inch	Absolute pressure, pounds per square inch	Temperature, Fahrenheit	Total heat above 32° F.		Latent heat $L = H - h$, heat-units	Volume, cubic feet in 1 pound of steam	Weight of 1 cubic foot steam, pound	Entropy of the water	Entropy of evaporation
			In the water h , heat-units	In the steam H , heat-units					
17.3	32	254.1	222.6	1165.1	942.5	12.93	0.0773	0.3733	1.3205
18.3	33	255.8	224.4	1165.7	941.3	12.57	0.0795	0.3759	1.3155
19.3	34	257.6	226.2	1166.3	940.1	12.22	0.0818	0.3784	1.3107
20.3	35	259.3	227.9	1166.8	938.9	11.89	0.0841	0.3808	1.3060
21.3	36	261.0	229.6	1167.3	937.7	11.58	0.0863	0.3832	1.3014
22.3	37	262.6	231.3	1167.8	936.6	11.29	0.0886	0.3855	1.2969
23.3	38	264.2	232.9	1168.4	935.5	11.01	0.0908	0.3877	1.2925
24.3	39	265.8	234.5	1168.9	934.4	10.74	0.0931	0.3899	1.2882
25.3	40	267.3	236.1	1169.4	933.3	10.49	0.0953	0.3920	1.2841
26.3	41	268.7	237.6	1169.8	932.2	10.25	0.0976	0.3941	1.2800
27.3	42	270.2	239.1	1170.3	931.2	10.02	0.0998	0.3962	1.2759
28.3	43	271.7	240.5	1170.7	930.2	9.80	0.1020	0.3982	1.2720
29.3	44	273.1	242.0	1171.2	929.2	9.59	0.1043	0.4002	1.2681
30.3	45	274.5	243.4	1171.6	928.2	9.39	0.1065	0.4021	1.2644
31.3	46	275.8	244.8	1172.0	927.2	9.20	0.1087	0.4040	1.2607
32.3	47	277.2	246.1	1172.4	926.3	9.02	0.1109	0.4059	1.2571
33.3	48	278.5	247.5	1172.8	925.3	8.84	0.1131	0.4077	1.2536
34.3	49	279.8	248.8	1173.2	924.4	8.67	0.1153	0.4095	1.2502
35.3	50	281.0	250.1	1173.6	923.5	8.51	0.1175	0.4113	1.2468
36.3	51	282.3	251.4	1174.0	922.6	8.35	0.1197	0.4130	1.2435
37.3	52	283.5	252.6	1174.3	921.7	8.20	0.1219	0.4147	1.2402
38.3	53	284.7	253.9	1174.7	920.8	8.05	0.1241	0.4164	1.2370
39.3	54	285.9	255.1	1175.0	919.9	7.91	0.1263	0.4180	1.2339
40.3	55	287.1	256.3	1175.4	919.0	7.78	0.1285	0.4196	1.2309
41.3	56	288.2	257.5	1175.7	918.2	7.65	0.1307	0.4212	1.2278
42.3	57	289.4	258.7	1176.0	917.4	7.52	0.1329	0.4227	1.2248
43.3	58	290.5	259.8	1176.4	916.5	7.40	0.1350	0.4242	1.2218
44.3	59	291.6	261.0	1176.7	915.7	7.28	0.1372	0.4257	1.2189
45.3	60	292.7	262.1	1177.0	914.9	7.17	0.1394	0.4272	1.2160
46.3	61	293.8	263.2	1177.3	914.1	7.06	0.1416	0.4287	1.2132
47.3	62	294.9	264.3	1177.6	913.3	6.95	0.1438	0.4302	1.2104
48.3	63	295.9	265.4	1177.9	912.5	6.85	0.1460	0.4316	1.2077
49.3	64	297.0	266.4	1178.2	911.8	6.75	0.1482	0.4330	1.2050
50.3	65	298.0	267.5	1178.5	911.0	6.65	0.1503	0.4344	1.2024
51.3	66	299.0	268.5	1178.8	910.2	6.56	0.1525	0.4358	1.1998
52.3	67	300.0	269.6	1179.0	909.5	6.47	0.1547	0.4371	1.1972
53.3	68	301.0	270.6	1179.3	908.7	6.38	0.1569	0.4385	1.1946
54.3	69	302.0	271.6	1179.6	908.0	6.29	0.1590	0.4398	1.1921
55.3	70	302.9	272.6	1179.8	907.2	6.20	0.1612	0.4411	1.1896
56.3	71	303.9	273.6	1180.1	906.5	6.12	0.1634	0.4424	1.1872

Properties of Saturated Steam (Continued)
(Condensed by Kent from Marks and Davis's Steam Tables.)

Gage pressure, pounds per square inch	Absolute pressure, pounds per square inch	Temperature, Fahrenheit	Total heat above 32° F.		Latent heat $L = H - h$, heat-units	Volume, cubic feet in 1 pound of steam	Weight of 1 cubic foot steam, pound	Entropy of the water	Entropy of evaporation
			In the water h , heat-units	In the steam H , heat-units					
57.3	72	304.8	274.5	1180.4	905.8	6.04	0.1656	0.4437	1.1848
58.3	73	305.8	275.5	1180.6	905.1	5.96	0.1678	0.4449	1.1825
59.3	74	306.7	276.5	1180.9	904.4	5.89	0.1699	0.4462	1.1801
60.3	75	307.6	277.4	1181.1	903.7	5.81	0.1721	0.4474	1.1778
61.3	76	308.5	278.3	1181.4	903.0	5.74	0.1743	0.4487	1.1755
62.3	77	309.4	279.3	1181.6	902.3	5.67	0.1764	0.4499	1.1732
63.3	78	310.3	280.2	1181.8	901.7	5.60	0.1786	0.4511	1.1710
64.3	79	311.2	281.1	1182.1	901.0	5.54	0.1808	0.4523	1.1687
65.3	80	312.0	282.0	1182.3	900.3	5.47	0.1829	0.4535	1.1665
66.3	81	312.9	282.9	1182.5	899.7	5.41	0.1851	0.4546	1.1644
67.3	82	313.8	283.8	1182.8	899.0	5.34	0.1873	0.4557	1.1623
68.3	83	314.6	284.6	1183.0	898.4	5.28	0.1894	0.4568	1.1602
69.3	84	315.4	285.5	1183.2	897.7	5.22	0.1915	0.4579	1.1581
70.3	85	316.3	286.3	1183.4	897.1	5.16	0.1937	0.4590	1.1561
71.3	86	317.1	287.2	1183.6	896.4	5.10	0.1959	0.4601	1.1540
72.3	87	317.9	288.0	1183.8	895.8	5.05	0.1980	0.4612	1.1520
73.3	88	318.7	288.9	1184.0	895.2	5.00	0.2001	0.4623	1.1500
74.3	89	319.5	289.7	1184.2	894.6	4.94	0.2023	0.4633	1.1481
75.3	90	320.3	290.5	1184.4	893.9	4.89	0.2044	0.4644	1.1461
76.3	91	321.1	291.3	1184.6	893.3	4.84	0.2065	0.4654	1.1442
77.3	92	321.8	292.1	1184.8	892.7	4.79	0.2087	0.4664	1.1423
78.3	93	322.6	292.9	1185.0	892.1	4.74	0.2109	0.4674	1.1404
79.3	94	323.4	293.7	1185.2	891.5	4.69	0.2130	0.4684	1.1385
80.3	95	324.1	294.5	1185.4	890.9	4.65	0.2151	0.4694	1.1367
81.3	96	324.9	295.3	1185.6	890.3	4.60	0.2172	0.4704	1.1348
82.3	97	325.6	296.1	1185.8	889.7	4.56	0.2193	0.4714	1.1330
83.3	98	326.4	296.8	1186.0	889.2	4.51	0.2215	0.4724	1.1312
84.3	99	327.1	297.6	1186.2	888.6	4.47	0.2237	0.4733	1.1295
85.3	100	327.8	298.3	1186.3	888.0	4.429	0.2258	0.4743	1.1277
87.3	102	329.3	299.8	1186.7	886.9	4.347	0.2300	0.4762	1.1242
89.3	104	330.7	301.3	1187.0	885.8	4.268	0.2343	0.4780	1.1208
91.3	106	332.0	302.7	1187.4	884.7	4.192	0.2336	0.4798	1.1174
93.3	108	333.4	304.1	1187.7	883.6	4.118	0.2429	0.4816	1.1141
95.3	110	334.8	305.5	1188.0	882.5	4.047	0.2472	0.4834	1.1108
97.3	112	336.1	306.9	1188.4	881.4	3.978	0.2514	0.4852	1.1076
99.3	114	337.4	308.3	1188.7	880.4	3.912	0.2556	0.4869	1.1045
101.3	116	338.7	309.6	1189.0	879.3	3.848	0.2599	0.4886	1.1014
103.3	118	340.0	311.0	1189.3	878.3	3.786	0.2641	0.4903	1.0984
105.3	120	341.3	312.3	1189.6	877.2	3.726	0.2683	0.4919	1.0954
107.3	122	342.5	313.6	1189.8	876.2	3.668	0.2726	0.4935	1.0924

Properties of Saturated Steam (Continued)

(Condensed by Kent from Marks and Davis's Steam Tables.)

Gage pressure, pounds per square inch	Absolute pressure, pounds per square inch	Temperature, Fahrenheit	Total heat above 32° F.		Latent heat $L = H - h$, heat-units	Volume, cubic feet in 1 pound of steam	Weight of 1 cubic foot steam, pound	Entropy of the water	Entropy of evaporation
			In the water h , heat-units	In the steam H , heat-units					
109.3	124	343.8	314.9	1190.1	875.2	3.611	0.2769	0.4951	1.0895
111.3	126	345.0	316.2	1190.4	874.2	3.556	0.2812	0.4967	1.0865
113.3	128	346.2	317.4	1190.7	873.3	3.504	0.2854	0.4982	1.0837
115.3	130	347.4	318.6	1191.0	872.3	3.452	0.2897	0.4998	1.0809
117.3	132	348.5	319.9	1191.2	871.3	3.402	0.2939	0.5013	1.0782
119.3	134	349.7	321.1	1191.5	870.4	3.354	0.2981	0.5028	1.0755
121.3	136	350.8	322.3	1191.7	869.4	3.308	0.3023	0.5043	1.0728
123.3	138	352.0	323.4	1192.0	868.5	3.263	0.3065	0.5057	1.0702
125.3	140	353.1	324.6	1192.2	867.6	3.219	0.3107	0.5072	1.0675
127.3	142	354.2	325.8	1192.5	866.7	3.175	0.3150	0.5086	1.0649
129.3	144	355.3	326.9	1192.7	865.8	3.133	0.3192	0.5100	1.0624
131.3	146	356.3	328.0	1192.9	864.9	3.092	0.3234	0.5114	1.0599
133.3	148	357.4	329.1	1193.2	864.0	3.052	0.3276	0.5128	1.0574
135.3	150	358.5	330.2	1193.4	863.2	3.012	0.3320	0.5142	1.0550
137.3	152	359.5	331.4	1193.6	862.3	2.974	0.3362	0.5155	1.0525
139.3	154	360.5	332.4	1193.8	861.4	2.938	0.3404	0.5169	1.0501
141.3	156	361.6	333.5	1194.1	860.6	2.902	0.3446	0.5182	1.0477
143.3	158	362.6	334.6	1194.3	859.7	2.868	0.3488	0.5195	1.0454
145.3	160	363.6	335.6	1194.5	858.8	2.834	0.3529	0.5208	1.0431
147.3	162	364.6	336.7	1194.7	858.0	2.801	0.3570	0.5220	1.0409
149.3	164	365.6	337.7	1194.9	857.2	2.769	0.3612	0.5233	1.0387
151.3	166	366.5	338.7	1195.1	856.4	2.737	0.3654	0.5245	1.0365
153.3	168	367.5	339.7	1195.3	855.5	2.706	0.3696	0.5257	1.0343
155.3	170	368.5	340.7	1195.4	854.7	2.675	0.3738	0.5269	1.0321
157.3	172	369.4	341.7	1195.6	853.9	2.645	0.3780	0.5281	1.0300
159.3	174	370.4	342.7	1195.8	853.1	2.616	0.3822	0.5293	1.0278
161.3	176	371.3	343.7	1196.0	852.3	2.588	0.3864	0.5305	1.0257
163.3	178	372.2	344.7	1196.2	851.5	2.560	0.3906	0.5317	1.0235
165.3	180	373.1	345.6	1196.4	850.8	2.533	0.3948	0.5328	1.0215
167.3	182	374.0	346.6	1196.6	850.0	2.507	0.3989	0.5339	1.0195
169.3	184	374.9	347.6	1196.8	849.2	2.481	0.4031	0.5351	1.0174
171.3	186	375.8	348.5	1196.9	848.4	2.455	0.4073	0.5362	1.0154
173.3	188	376.7	349.4	1197.1	847.7	2.430	0.4115	0.5373	1.0134
175.3	190	377.6	350.4	1197.3	846.9	2.406	0.4157	0.5384	1.0114
177.3	192	378.5	351.3	1197.4	846.1	2.381	0.4199	0.5395	1.0095
179.3	194	379.3	352.2	1197.6	845.4	2.358	0.4241	0.5405	1.0076
181.3	196	380.2	353.1	1197.8	844.7	2.335	0.4283	0.5416	1.0056
183.3	198	381.0	354.0	1197.9	843.9	2.312	0.4325	0.5426	1.0038
185.3	200	381.9	354.9	1198.1	843.2	2.290	0.437	0.5437	1.0019
190.3	205	384.0	357.1	1198.5	841.4	2.237	0.447	0.5463	0.9973

Properties of Saturated Steam (Concluded)

(Condensed by Kent from Marks and Davis's Steam Tables.)

Gage pressure, pounds per square inch	Absolute pressure, pounds per square inch	Temperature, Fahrenheit	Total heat above 32° F.		Latent heat $L = H - h$, heat-units	Volume, cubic feet in 1 pound of steam	Weight of 1 cubic foot steam, pounds	Entropy of the water	Entropy of evaporation
			In the water h , heat-units	In the steam H , heat-units					
195.3	210	386.0	359.2	1198.8	839.6	2.187	0.457	0.5488	0.9928
200.3	215	388.0	361.4	1199.2	837.9	2.138	0.468	0.5513	0.9885
205.3	220	389.9	363.4	1199.6	836.2	2.091	0.478	0.5538	0.9841
210.3	225	391.9	365.5	1199.9	834.4	2.046	0.489	0.5562	0.9799
215.3	230	393.8	367.5	1200.2	832.8	2.004	0.499	0.5586	0.9758
220.3	235	395.6	369.4	1200.6	831.1	1.964	0.509	0.5610	0.9717
225.3	240	397.4	371.4	1200.9	829.5	1.924	0.520	0.5633	0.9676
230.3	245	399.3	373.3	1201.2	827.9	1.887	0.530	0.5655	0.9638
235.3	250	401.1	375.2	1201.5	826.3	1.850	0.541	0.5676	0.9600
245.3	260	404.5	378.9	1202.1	823.1	1.782	0.561	0.5719	0.9525
255.3	270	407.9	382.5	1202.6	820.1	1.718	0.582	0.5760	0.9454
265.3	280	411.2	386.0	1203.1	817.1	1.658	0.603	0.5800	0.9385
275.3	290	414.4	389.4	1203.6	814.2	1.602	0.624	0.5840	0.9316
285.3	300	417.5	392.7	1204.1	811.3	1.551	0.645	0.5878	0.9251
295.3	310	420.5	395.9	1204.5	808.5	1.502	0.666	0.5915	0.9187
305.3	320	423.4	399.1	1204.9	805.8	1.456	0.687	0.5951	0.9125
315.3	330	426.3	402.2	1205.3	803.1	1.413	0.708	0.5986	0.9065
325.3	340	429.1	405.3	1205.7	800.4	1.372	0.729	0.6020	0.9006
335.3	350	431.9	408.2	1206.1	797.8	1.334	0.750	0.6053	0.8949
345.3	360	434.6	411.2	1206.4	795.3	1.298	0.770	0.6085	0.8894
355.3	370	437.2	414.0	1206.8	792.8	1.264	0.791	0.6116	0.8840
365.3	380	439.8	416.8	1207.1	790.3	1.231	0.812	0.6147	0.8788
375.3	390	442.3	419.5	1207.4	787.9	1.200	0.833	0.6178	0.8737
385.3	400	444.8	422.2	1208.0	786.0	1.17	0.86	0.621	0.868
435.3	450	456.5	435.0	1209.0	774.0	1.04	0.96	0.635	0.844
485.3	500	467.3	448.0	1210.0	762.0	0.93	1.08	0.648	0.822
535.3	550	477.3	459.0	1210.0	751.0	0.83	1.20	0.659	0.801
585.3	600	486.6	469.0	1210.0	741.0	0.76	1.32	0.670	0.783

Factors of Evaporation

The factors in the following table, which has been condensed from Kent's Mechanical Engineers' Pocket Book, were obtained, for the various feed-water temperatures and steam pressures given, by subtracting the heat above 32° in one pound of feed-water from the total heat above 32° in one pound of steam, and dividing the remainder by 970.4, the latent heat of steam at 212°. The values of the total heat of steam, heat of feed-water and latent heat of steam are those given in Marks and Davis's steam tables. Intermediate values may be found by interpolation.

Example: Given the boiler pressure = 115 pounds per square inch absolute, and the temperature of feed-water = 62° F., to find the factor of evaporation. Look in the column headed 115 and opposite 62°; the factor required is 1.1941. It will therefore require 1.1941 times as many heat-units to evaporate a certain weight of water from a feed-water temperature of 62° F. into steam under 115 pounds pressure, as would be required to evaporate the same weight of water from a temperature of 212° F. into steam at 212° F., that is, from and at 212° F.

Factors of Evaporation

Gage pressure, pounds	0.3	10.3	20.3	30.3	40.3	50.3	60.3	70.3	80.3
Absolute pressure, pounds	15.	25.	35.	45.	55.	65.	75.	85.	95.
Temperature of feed-water, ° F.	Factors of evaporation								
32	1.1858	1.1958	1.2024	1.2073	1.2113	1.2144	1.2171	1.2195	1.2216
38	1.1796	1.1896	1.1962	1.2011	1.2050	1.2082	1.2109	1.2133	1.2153
44	1.1734	1.1834	1.1900	1.1949	1.1988	1.2020	1.2047	1.2071	1.2091
50	1.1672	1.1772	1.1838	1.1887	1.1926	1.1958	1.1985	1.2009	1.2029
56	1.1610	1.1710	1.1776	1.1825	1.1864	1.1896	1.1923	1.1947	1.1967
62	1.1548	1.1648	1.1714	1.1763	1.1803	1.1835	1.1861	1.1885	1.1906
68	1.1486	1.1586	1.1652	1.1702	1.1741	1.1773	1.1800	1.1823	1.1844
74	1.1425	1.1525	1.1591	1.1640	1.1679	1.1711	1.1738	1.1762	1.1782
80	1.1363	1.1463	1.1529	1.1578	1.1618	1.1650	1.1676	1.1700	1.1721
86	1.1301	1.1401	1.1467	1.1518	1.1556	1.1588	1.1615	1.1638	1.1659
92	1.1240	1.1340	1.1406	1.1455	1.1494	1.1526	1.1553	1.1577	1.1597
98	1.1178	1.1278	1.1344	1.1393	1.1433	1.1465	1.1491	1.1515	1.1536
104	1.1116	1.1216	1.1282	1.1332	1.1371	1.1403	1.1430	1.1453	1.1474
110	1.1055	1.1155	1.1221	1.1270	1.1309	1.1341	1.1368	1.1392	1.1412
116	1.0993	1.1093	1.1159	1.1209	1.1248	1.1280	1.1306	1.1330	1.1351
122	1.0931	1.1031	1.1097	1.1147	1.1186	1.1218	1.1245	1.1269	1.1289
128	1.0870	1.0970	1.1036	1.1085	1.1124	1.1156	1.1183	1.1207	1.1227
134	1.0808	1.0908	1.0974	1.1023	1.1063	1.1095	1.1121	1.1145	1.1166
140	1.0746	1.0846	1.0912	1.0962	1.1001	1.1033	1.1060	1.1083	1.1104
146	1.0685	1.0785	1.0851	1.0900	1.0939	1.0971	1.0998	1.1022	1.1042
152	1.0623	1.0723	1.0789	1.0838	1.0877	1.0909	1.0936	1.0960	1.0980
158	1.0561	1.0661	1.0727	1.0776	1.0816	1.0847	1.0874	1.0898	1.0919
164	1.0499	1.0599	1.0665	1.0715	1.0754	1.0786	1.0812	1.0836	1.0857
170	1.0437	1.0537	1.0603	1.0653	1.0692	1.0724	1.0751	1.0774	1.0795
176	1.0375	1.0475	1.0541	1.0591	1.0630	1.0662	1.0689	1.0712	1.0733
182	1.0313	1.0413	1.0479	1.0529	1.0568	1.0600	1.0627	1.0650	1.0671
188	1.0251	1.0351	1.0417	1.0467	1.0506	1.0538	1.0565	1.0588	1.0609
194	1.0189	1.0289	1.0355	1.0405	1.0444	1.0476	1.0503	1.0526	1.0547
200	1.0127	1.0227	1.0293	1.0343	1.0382	1.0414	1.0441	1.0464	1.0485
206	1.0065	1.0165	1.0231	1.0281	1.0320	1.0352	1.0379	1.0402	1.0423
212	1.0003	1.0103	1.0169	1.0218	1.0258	1.0290	1.0316	1.0340	1.0361

Factors of Evaporation (Continued)

Gage pressure, pounds	90.3	100.3	110.3	120.3	130.3	140.3	150.3	160.3	170.3
Absolute pressure, pounds	105.	115.	125.	135.	145.	155.	165.	175.	185.
Temperature of feed-water, ° F.	Factors of evaporation								
32	I. 2234	I. 2251	I. 2266	I. 2279	I. 2292	I. 2304	I. 2315	I. 2324	I. 2333
38	I. 2172	I. 2188	I. 2204	I. 2217	I. 2230	I. 2242	I. 2252	I. 2262	I. 2271
44	I. 2110	I. 2126	I. 2142	I. 2155	I. 2168	I. 2180	I. 2190	I. 2200	I. 2209
50	I. 2048	I. 2064	I. 2080	I. 2093	I. 2106	I. 2118	I. 2128	I. 2137	I. 2147
56	I. 1986	I. 2002	I. 2018	I. 2031	I. 2044	I. 2056	I. 2066	I. 2076	I. 2085
62	I. 1924	I. 1941	I. 1956	I. 1970	I. 1982	I. 1994	I. 2005	I. 2014	I. 2023
68	I. 1862	I. 1879	I. 1894	I. 1908	I. 1920	I. 1933	I. 1943	I. 1952	I. 1961
74	I. 1801	I. 1817	I. 1833	I. 1846	I. 1859	I. 1871	I. 1881	I. 1890	I. 1900
80	I. 1739	I. 1756	I. 1771	I. 1785	I. 1797	I. 1809	I. 1820	I. 1829	I. 1838
86	I. 1678	I. 1694	I. 1710	I. 1723	I. 1735	I. 1748	I. 1758	I. 1767	I. 1776
92	I. 1616	I. 1632	I. 1648	I. 1661	I. 1674	I. 1686	I. 1696	I. 1705	I. 1715
98	I. 1554	I. 1571	I. 1586	I. 1600	I. 1612	I. 1624	I. 1635	I. 1644	I. 1653
104	I. 1492	I. 1509	I. 1525	I. 1538	I. 1550	I. 1563	I. 1573	I. 1582	I. 1592
110	I. 1431	I. 1447	I. 1463	I. 1476	I. 1489	I. 1501	I. 1511	I. 1521	I. 1530
116	I. 1369	I. 1386	I. 1401	I. 1415	I. 1427	I. 1439	I. 1450	I. 1459	I. 1468
122	I. 1308	I. 1324	I. 1340	I. 1353	I. 1365	I. 1378	I. 1388	I. 1397	I. 1407
128	I. 1246	I. 1262	I. 1278	I. 1291	I. 1304	I. 1316	I. 1326	I. 1336	I. 1345
134	I. 1184	I. 1201	I. 1216	I. 1230	I. 1242	I. 1254	I. 1265	I. 1274	I. 1283
140	I. 1123	I. 1139	I. 1154	I. 1168	I. 1180	I. 1193	I. 1203	I. 1212	I. 1221
146	I. 1061	I. 1077	I. 1093	I. 1106	I. 1119	I. 1131	I. 1141	I. 1150	I. 1160
152	I. 0999	I. 1015	I. 1031	I. 1044	I. 1057	I. 1069	I. 1079	I. 1089	I. 1098
158	I. 0937	I. 0954	I. 0969	I. 0982	I. 0995	I. 1007	I. 1018	I. 1027	I. 1036
164	I. 0875	I. 0892	I. 0907	I. 0921	I. 0933	I. 0945	I. 0956	I. 0965	I. 0974
170	I. 0813	I. 0830	I. 0845	I. 0859	I. 0871	I. 0883	I. 0894	I. 0903	I. 0912
176	I. 0752	I. 0768	I. 0783	I. 0797	I. 0809	I. 0822	I. 0832	I. 0841	I. 0850
182	I. 0690	I. 0706	I. 0721	I. 0735	I. 0747	I. 0760	I. 0770	I. 0779	I. 0788
188	I. 0628	I. 0644	I. 0660	I. 0673	I. 0685	I. 0698	I. 0708	I. 0717	I. 0727
194	I. 0566	I. 0582	I. 0597	I. 0611	I. 0623	I. 0636	I. 0646	I. 0655	I. 0664
200	I. 0504	I. 0520	I. 0535	I. 0549	I. 0561	I. 0574	I. 0584	I. 0593	I. 0602
206	I. 0441	I. 0458	I. 0473	I. 0487	I. 0499	I. 0511	I. 0522	I. 0531	I. 0540
212	I. 0379	I. 0396	I. 0411	I. 0425	I. 0437	I. 0449	I. 0460	I. 0469	I. 0478

Factors of Evaporation (Concluded)

Gage pressure, pounds	180.3	190.3	200.3	210.3	220.3	230.3	240.3	250.3
Absolute pressure, pounds	195.	205.	215.	225.	235.	245.	255.	265.
Temperature of feed-water, ° F.	Factors of evaporation							
32	1.2342	1.2351	1.2358	1.2365	1.2372	1.2378	1.2384	1.2390
38	1.2280	1.2288	1.2296	1.2303	1.2310	1.2316	1.2322	1.2328
44	1.2218	1.2226	1.2234	1.2241	1.2248	1.2254	1.2260	1.2266
50	1.2156	1.2164	1.2171	1.2179	1.2186	1.2192	1.2198	1.2204
56	1.2094	1.2102	1.2110	1.2117	1.2124	1.2130	1.2136	1.2142
62	1.2032	1.2041	1.2048	1.2055	1.2062	1.2068	1.2074	1.2080
68	1.1971	1.1979	1.1986	1.1993	1.2001	1.2007	1.2012	1.2019
74	1.1909	1.1917	1.1924	1.1932	1.1939	1.1945	1.1951	1.1957
80	1.1847	1.1856	1.1863	1.1870	1.1877	1.1883	1.1889	1.1895
86	1.1786	1.1794	1.1801	1.1808	1.1816	1.1822	1.1827	1.1834
92	1.1724	1.1732	1.1739	1.1747	1.1754	1.1760	1.1766	1.1772
98	1.1662	1.1671	1.1678	1.1685	1.1692	1.1698	1.1704	1.1710
104	1.1601	1.1609	1.1616	1.1624	1.1631	1.1637	1.1643	1.1649
110	1.1539	1.1547	1.1555	1.1562	1.1569	1.1575	1.1581	1.1587
116	1.1478	1.1486	1.1493	1.1500	1.1507	1.1514	1.1519	1.1525
122	1.1416	1.1424	1.1431	1.1439	1.1446	1.1452	1.1458	1.1464
128	1.1354	1.1362	1.1370	1.1377	1.1384	1.1390	1.1396	1.1402
134	1.1292	1.1301	1.1308	1.1315	1.1322	1.1329	1.1334	1.1340
140	1.1231	1.1239	1.1246	1.1253	1.1261	1.1267	1.1272	1.1279
146	1.1169	1.1177	1.1184	1.1192	1.1199	1.1205	1.1211	1.1217
152	1.1107	1.1115	1.1123	1.1130	1.1137	1.1143	1.1149	1.1155
158	1.1045	1.1054	1.1061	1.1068	1.1075	1.1081	1.1087	1.1093
164	1.0984	1.0992	1.0999	1.1006	1.1013	1.1019	1.1025	1.1031
170	1.0922	1.0930	1.0937	1.0944	1.0951	1.0958	1.0963	1.0969
176	1.0860	1.0868	1.0875	1.0882	1.0890	1.0896	1.0901	1.0908
182	1.0798	1.0806	1.0813	1.0820	1.0828	1.0834	1.0839	1.0846
188	1.0736	1.0744	1.0751	1.0758	1.0766	1.0772	1.0778	1.0784
194	1.0674	1.0682	1.0689	1.0696	1.0704	1.0710	1.0715	1.0722
200	1.0612	1.0620	1.0627	1.0634	1.0642	1.0648	1.0653	1.0660
206	1.0550	1.0558	1.0565	1.0572	1.0579	1.0586	1.0591	1.0597
212	1.0487	1.0496	1.0503	1.0510	1.0517	1.0523	1.0529	1.0535

SUPERHEATED STEAM

Steam in the presence of the water from which it is generated is called "saturated steam"; it has the same temperature as the water, and can have only one pressure and one density at any given temperature—the three are in fixed relationship to each other. Superheated steam has a higher temperature than saturated steam at the same pressure, and is produced by adding heat to saturated steam in a separate vessel called a superheater. It is independent of pressure, since at any pressure the steam may have any desired temperature. In practice the superheater is an extension of the steam space of the boiler, with which it is in open communication, and the pressure of the steam in the superheater is practically the boiler pressure.

Volume of Superheated Steam. Superheated steam is greater in volume than saturated steam of the same pressure. Linde's equation (1905) is

pv = 0.5962 T - p(1 + 0.0014 p) (150 300 000 / T^3 - 0.0833),

where p = pressure in pounds per square inch;
v = volume in cubic feet;
T = absolute temperature.

Specific Heat of Superheated Steam. The following table of Knoblauch and Jakob (from Peabody's Steam Tables) gives the mean specific heat of superheated steam from the temperature of saturation to various temperatures at several pressures:

Kilograms per square centimeter		1	2	4	6	8	10	12	14	16	18	20
Pounds per square inch		14.2	28.4	56.9	85.3	113.8	142.2	170.6	199.1	227.5	256.0	284.4
Temperature saturation °C.		99	120	143	158	169	179	187	194	200	206	211
Temperature saturation °F.		210	248	289	316	336	354	369	381	392	403	412
°F.	°C.											
212	100	0.463										
302	150	.462	.478	.515								
392	200	.462	.475	.502	.530	.560	.597	.635	.677			
482	250	.463	.474	.495	.514	.532	.552	.570	.588	.609	.635	.664
572	300	.464	.475	.492	.505	.517	.530	.541	.550	.561	.572	.585
662	350	.468	.477	.492	.503	.512	.522	.529	.536	.543	.550	.557
752	400	.473	.481	.494	.504	.512	.520	.526	.531	.537	.542	.547

Thus the mean specific heat of steam at 142.2 pounds pressure when superheated to 572° F. is 0.53. The heat required to raise 1 pound of steam from a saturation temperature of 354° to 572° is $(572 - 354) 0.53 = 115.5$ B.T.U. The total heat of the superheated steam is the sum of this quantity and the heat in the saturated steam. It is given directly in the properties of superheated steam for various degrees of superheat.

Advantages of Superheating. The advantage to be gained by superheating is not due to increased thermodynamic efficiency. The economy which results from the application of superheat is due to the reduction of the internal thermal waste of the engine, incident to cylinder condensation. The steam entering the cylinder strikes the walls, which have been cooled by the previous exhaust. The heat necessary to warm the walls to the temperature of the entering steam can be supplied only by the steam, and if it is saturated some of it must be condensed. If the steam is superheated it must be reduced to the temperature of saturated steam at the given pressure, before condensation takes place.

Superheating is superior to any other known means of reduction of this internal waste. The saving due to its use is found to be greater with engines that are most inefficient with saturated steam; small engines profit more by it than large, slow engines more than fast, and single engines more than multiple expansion engines.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Properties of Superheated Steam

(Condensed by Kent from Marks and Davis's Steam Tables.)

V = specific volume in cubic feet per pound; H = total heat, from water at 32° F. in B.T.U. per pound; N = entropy, from water at 32°.

Pressure absolute, lbs. per sq. inch	Temperature saturated steam	Degrees of superheat				
		0	20	50	100	150
20	228.0	V 20.08	20.73	21.69	23.25	24.80
		H 1156.2	1165.7	1179.9	1203.5	1227.1
		N 1.7320	1.7456	1.7652	1.7961	1.8251
40	267.3	V 10.49	10.83	11.33	12.13	12.93
		H 1169.4	1179.3	1194.0	1218.4	1242.4
		N 1.6761	1.6895	1.7089	1.7392	1.7674
60	292.7	V 7.17	7.40	7.75	8.30	8.84
		H 1177.0	1187.3	1202.6	1227.6	1252.1
		N 1.6432	1.6568	1.6761	1.7062	1.7342
80	312.0	V 5.47	5.65	5.92	6.34	6.75
		H 1182.3	1193.0	1208.8	1234.3	1259.0
		N 1.6200	1.6338	1.6532	1.6833	1.7110
100	327.8	V 4.43	4.58	4.79	5.14	5.47
		H 1186.3	1197.5	1213.8	1239.7	1264.7
		N 1.6020	1.6160	1.6358	1.6658	1.6933
120	341.3	V 3.73	3.85	4.04	4.33	4.62
		H 1189.6	1201.1	1217.9	1244.1	1269.3
		N 1.5873	1.6016	1.6216	1.6517	1.6789
140	353.1	V 3.22	3.32	3.49	3.75	4.00
		H 1192.2	1204.3	1221.4	1248.0	1273.3
		N 1.5747	1.5894	1.6096	1.6395	1.6666
160	363.6	V 2.83	2.93	3.07	3.30	3.53
		H 1194.5	1207.0	1224.5	1251.3	1276.8
		N 1.5639	1.5789	1.5993	1.6292	1.6561
180	373.1	V 2.53	2.62	2.75	2.96	3.16
		H 1196.4	1209.4	1227.2	1254.3	1279.9
		N 1.5543	1.5697	1.5904	1.6201	1.6468
200	381.9	V 2.29	2.37	2.49	2.68	2.86
		H 1198.1	1211.6	1229.8	1257.1	1282.6
		N 1.5456	1.5614	1.5823	1.6120	1.6385
220	389.9	V 2.09	2.16	2.28	2.45	2.62
		H 1199.6	1213.6	1232.2	1259.6	1285.2
		N 1.5379	1.5541	1.5753	1.6049	1.6312
240	397.4	V 1.92	1.99	2.09	2.26	2.42
		H 1200.9	1215.4	1234.3	1261.9	1287.6
		N 1.5309	1.5476	1.5690	1.5985	1.6246
260	404.5	V 1.78	1.84	1.94	2.10	2.24
		H 1202.1	1217.1	1236.4	1264.1	1289.9
		N 1.5244	1.5416	1.5631	1.5926	1.6186
280	411.2	V 1.66	1.72	1.81	1.95	2.09
		H 1203.1	1218.7	1238.4	1266.2	1291.9
		N 1.5185	1.5362	1.5580	1.5873	1.6133
300	417.5	V 1.55	1.60	1.69	1.83	1.96
		H 1204.1	1220.2	1240.3	1268.2	1294.0
		N 1.5129	1.5310	1.5530	1.5824	1.6082
400	444.8	V 1.17	1.21	1.28	1.40	1.50
		H 1207.7	1227.2	1248.6	1276.9	1303.0
		N 1.4894	1.5107	1.5336	1.5625	1.5880
500	467.3	V 0.93	0.97	1.03	1.13	1.22
		H 1210	1233	1256	1285	1311
		N 1.470	1.496	1.519	1.548	1.573

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Properties of Superheated Steam (Concluded)

(Condensed by Kent from Marks and Davis's Steam Tables.)

V = specific volume in cubic feet per pound; H = total heat, from water at 32° F. in B.T.U. per pound; N = entropy, from water at 32°.

Pressure absolute, lbs. per sq. inch	Temperature saturated steam	Degrees of superheat				
		200	250	300	400	500
20	228.0	V 26.33	27.85	29.37	32.39	35.40
		H 1250.6	1274.1	1297.6	1344.8	1392.2
		N 1.8524	1.8781	1.9026	1.9479	1.9893
40	267.3	V 13.70	14.48	15.25	16.78	18.30
		H 1266.4	1290.3	1314.1	1361.6	1409.3
		N 1.7940	1.8189	1.8427	1.8867	1.9271
60	292.7	V 9.36	9.89	10.41	11.43	12.45
		H 1276.4	1300.4	1324.3	1372.2	1420.0
		N 1.7603	1.7849	1.8081	1.8511	1.8908
80	312.0	V 7.17	7.56	7.95	8.72	9.49
		H 1283.6	1307.8	1331.9	1379.8	1427.9
		N 1.7368	1.7612	1.7840	1.8265	1.8658
100	327.8	V 5.80	6.12	6.44	7.07	7.69
		H 1289.4	1313.6	1337.8	1385.9	1434.1
		N 1.7188	1.7428	1.7656	1.8079	1.8468
120	341.3	V 4.89	5.17	5.44	5.96	6.48
		H 1294.1	1318.4	1342.7	1391.0	1439.4
		N 1.7041	1.7280	1.7505	1.7924	1.8311
140	353.1	V 4.24	4.48	4.71	5.16	5.61
		H 1298.2	1322.6	1346.9	1395.4	1443.8
		N 1.6916	1.7152	1.7376	1.7792	1.8177
160	363.6	V 3.74	3.95	4.15	4.56	4.95
		H 1301.7	1326.2	1350.6	1399.3	1447.9
		N 1.6810	1.7043	1.7266	1.7680	1.8063
180	373.1	V 3.35	3.54	3.72	4.09	4.44
		H 1304.8	1329.5	1353.9	1402.7	1451.4
		N 1.6716	1.6948	1.7169	1.7581	1.7962
200	381.9	V 3.04	3.21	3.38	3.71	4.03
		H 1307.7	1332.4	1357.0	1405.9	1454.7
		N 1.6632	1.6862	1.7082	1.7493	1.7872
220	389.9	V 2.78	2.94	3.10	3.40	3.69
		H 1310.3	1335.1	1359.8	1408.8	1457.7
		N 1.6558	1.6787	1.7005	1.7415	1.7792
240	397.4	V 2.57	2.71	2.85	3.13	3.40
		H 1312.8	1337.6	1362.3	1411.5	1460.5
		N 1.6492	1.6720	1.6937	1.7344	1.7721
260	404.5	V 2.39	2.52	2.65	2.91	3.16
		H 1315.1	1340.0	1364.7	1414.0	1463.2
		N 1.6430	1.6658	1.6874	1.7280	1.7655
280	411.2	V 2.22	2.35	2.48	2.72	2.95
		H 1317.2	1342.2	1367.0	1416.4	1465.7
		N 1.6375	1.6603	1.6818	1.7223	1.7597
300	417.5	V 2.09	2.21	2.33	2.55	2.77
		H 1319.3	1344.3	1369.2	1418.6	1468.0
		N 1.6323	1.6550	1.6765	1.7168	1.7541
400	444.8	V 1.60	1.70	1.79	1.97	2.14
		H 1328.6	1353.9	1379.1	1429.0	1478.9
		N 1.6117	1.6342	1.6554	1.6955	1.7323
500	467.3	V 1.31	1.39	1.47	1.62	1.76
		H 1337	1362	1388	1438	1489
		N 1.597	1.619	1.640	1.679	1.715

FLOW OF STEAM

Flow of Steam from Orifices. The flow of steam of a higher pressure toward a lower pressure increases as the difference of pressure is increased, until the external pressure becomes only 58 per cent of the absolute initial pressure. Any further reduction of the external pressure, even to the extent of a perfect vacuum, neither increases nor diminishes the flow of steam. In flowing through a nozzle of the best form, the steam expands to the external pressure and to the volume corresponding to this pressure, so long as it is not less than 58 per cent of the internal pressure. For an external pressure of 58 per cent or less, the ratio of expansion is 1.624.

The following formula is frequently used to determine the flow of steam through an orifice against a pressure greater than 58 per cent of the discharge:

$$W = 1.9 AK \sqrt{(P - d)d},$$

where

W = weight discharged in pounds per minute;

A = area of orifice in square inches;

P = absolute initial pressure in pounds per square inch;

d = difference in pressure between the two sides, in pounds per square inch;

K = coefficient = .93 for a short pipe = .63 for a hole in a thin plate.

Flow of Steam into the Atmosphere. When steam of varying initial pressure is discharged into the atmosphere — the atmospheric pressure being not more than 58 per cent of the initial pressure — the velocity of outflow at constant density, that is, supposing the initial density to be maintained, is given by the formula,

$$V = 3.5953 \sqrt{h},$$

where V = the velocity of outflow in feet per second, as for steam of the initial density, and h = the height in feet, of a column of steam of the given initial pressure, the weight of which is equal to the pressure on the unit of base.

The lowest initial pressure to which this formula applies, when steam is discharged into the atmosphere, is 25.37 pounds per square inch.

The following table gives the outflow of steam into the atmosphere for various internal pressures. The velocity of steam above 25.37 pounds per square inch absolute pressure, increases very slowly with the pressure, because the density, and the weight to be moved, increase with the pressure. An average of 900 feet per second may, for approximate calculations, be taken for the velocity of outflow as for constant density, that is, taking the volume of the steam at the initial volume.

Outflow of Steam into the Atmosphere

(D. K. Clark.)

Initial pressure, pounds per square inch absolute	External pressure, pounds per square inch absolute	Expansion in nozzle, ratio	Velocity of outflow at constant density, feet per second	Actual velocity of outflow expanded, feet per second	Discharge, pounds per square inch per minute
25.37	14.7	1.624	863	1401	22.81
30	14.7	1.624	867	1408	26.84
40	14.7	1.624	874	1419	35.18
45	14.7	1.624	877	1424	39.78
50	14.7	1.624	880	1429	44.06
60	14.7	1.624	885	1437	52.59
70	14.7	1.624	889	1444	61.07
75	14.7	1.624	891	1447	65.30
90	14.7	1.624	895	1454	77.94
100	14.7	1.624	898	1459	86.34
115	14.7	1.624	902	1466	98.76
135	14.7	1.624	906	1472	115.61
155	14.7	1.624	910	1478	132.21
165	14.7	1.624	912	1481	140.46
215	14.7	1.624	919	1493	181.58

Napier's approximate formula for the outflow of steam into the atmosphere, when the pressure of the atmosphere receiving the steam is less than 58 per cent of the initial pressure, is $W = ap \div 70$, where W is weight discharged, in pounds per second, a = area of orifice in square inches, and p = absolute initial pressure in pounds per square inch.

Flow of Steam in Pipes. The most generally accepted formula for the flow of steam in pipes is

$$W = 87 \sqrt{\frac{w(p_1 - p_2)d^5}{L \left(1 + \frac{3.6}{d}\right)}} \quad (1)$$

or

$$p_1 - p_2 = 0.000132 \left(1 + \frac{3.6}{d}\right) \frac{W^2 L}{w d^5} \quad (2)$$

where W = weight of steam in pounds per minute;

p_1 = initial pressure in pounds per square inch;

p_2 = final pressure in pounds per square inch;

L = length of pipe in feet;

d = inside diameter of pipe in inches;

w = density of steam in pounds per cubic foot.

The quantity of steam flowing with a given drop in pressure may be calculated by formula (1), while the drop for a given flow may be obtained from formula (2). The following table computed by E. C. Sickles (Trans. A. S. M. E., XX, 354) is calculated by a formula which,

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when reduced to a form similar to that of formula (1), gives a coefficient 87.45 instead of 87.

Table I gives the discharge in pounds per minute for pipes of various diameters corresponding to drops of pressure as given in Table II. The drops of pressure are computed for a length of 1000 feet; for any other length the drop is proportional to the length divided by 1000. In using the table the absolute pressure should be taken as the mean of the initial and final pressures in computing the carrying capacity.

Table I. — Steam in Pounds per Minute, Corresponding to Drop in Pressure in Table II.

Diameter	24	22	20	18	16	15	14	13	12	11	10
Line											
1	14 000	11 188	8772	6678	4923	4163	3481	2871	2328	1853	1443
2	13 000	10 392	8144	6203	4573	3867	3233	2667	2165	1721	1341
3	12 000	9 593	7517	5724	4220	3569	2983	2461	1996	1589	1237
4	11 000	8 804	6891	5247	3868	3271	2736	2256	1830	1456	1134
5	10 000	7 992	6265	4770	3517	2974	2486	2051	1663	1324	1031
6	9 500	7 705	5947	4532	3341	2825	2362	1940	1580	1258	979
7	9 000	7 205	5638	4293	3165	2676	2237	1846	1497	1192	928
8	8 500	6 905	5321	4054	2989	2527	2113	1743	1414	1125	876
9	8 000	6 506	5012	3816	2814	2379	1989	1640	1331	1059	825
10	7 500	6 106	4695	3577	2638	2230	1865	1538	1248	993	773
11	7 000	5 707	4385	3339	2462	2082	1740	1435	1164	927	722
12	6 500	5 307	4069	3100	2286	1933	1616	1333	1081	860	670
13	6 000	4 908	3758	2862	2110	1784	1492	1230	998	794	619
14	5 500	4 508	3443	2623	1934	1635	1368	1128	915	728	567
15	5 000	4 108	3132	2385	1758	1487	1243	1025	832	662	516

Diameter	9	8	7	6	5	4	3½	3	2½	2	1½	1
Line												
1	1093	799	560	371	227	123	71.6	55.9	28.8	18.1	6.81	2.52
2	1015	742	521	344	210	114.6	68.6	51.9	27.6	16.8	6.52	2.34
3	937	685	481	318	194	106.0	65.6	47.9	26.4	15.5	6.24	2.16
4	859	628	441	292	178	97.0	62.7	43.9	25.2	14.2	5.95	1.98
5	781	571	401	265	162	88.2	59.7	39.9	24.0	12.9	5.67	1.80
6	742	542	381	252	154	83.8	56.5	37.9	22.8	12.3	5.29	1.71
7	703	514	361	239	146	79.4	53.5	35.9	21.6	11.6	5.00	1.62
8	664	485	341	226	138	75.0	50.5	33.9	20.4	10.9	4.72	1.53
9	625	457	321	212	130	70.6	47.6	31.9	19.2	10.3	4.43	1.44
10	586	428	301	199	122	66.2	44.5	29.9	18.0	9.68	4.15	1.35
11	547	400	281	186	113	61.7	41.6	27.9	16.8	9.03	3.86	1.26
12	508	371	261	172	105	57.3	38.6	25.9	15.6	8.38	3.68	1.17
13	469	343	241	159	97.2	52.9	35.6	23.9	14.4	7.74	3.40	1.08
14	430	314	221	146	89.1	48.5	32.6	21.9	13.2	7.10	3.11	0.99
15	390	286	200	132	81.0	44.1	29.6	20.0	12.0	6.45	2.83	0.90

Table II. — Drop in Pressure in Pounds per Square Inch, per 1000 Feet Length, Corresponding to Discharge in Table I

Density Pres- sure }	0.208 90	0.230 100	0.273 120	0.295 130	0.316 140	0.338 150	0.401 180	0.443 200	0.485 220	0.548 250
Line										
1	18.1	16.4	13.8	12.8	11.9	11.1	9.39	8.50	7.76	6.87
2	15.6	14.1	11.9	11.0	10.3	9.60	8.09	7.33	6.69	5.92
3	13.3	12.0	10.1	9.38	8.75	8.18	6.90	6.24	5.70	5.05
4	11.1	10.0	8.46	7.83	7.31	6.83	5.76	5.21	4.76	4.21
5	9.25	8.36	7.5	6.52	6.09	5.69	4.80	4.34	3.97	3.51
6	8.33	7.53	6.35	5.87	5.48	5.13	4.32	3.91	3.57	3.16
7	7.48	6.76	5.70	5.27	4.92	4.60	3.88	3.51	3.21	2.84
8	6.67	6.03	5.08	4.70	4.39	4.10	3.46	3.13	2.86	2.53
9	5.91	5.35	4.50	4.17	3.89	3.64	3.07	2.78	2.53	2.24
10	5.19	4.69	3.95	3.66	3.42	3.19	2.69	2.44	2.23	1.97
11	4.52	4.09	3.44	3.19	2.98	2.78	2.34	2.12	1.94	1.72
12	3.90	3.53	2.97	2.75	2.57	2.40	2.02	1.83	1.67	1.48
13	3.32	3.00	2.53	2.34	2.19	2.04	1.72	1.56	1.42	1.26
14	2.79	2.52	2.13	1.97	1.84	1.72	1.45	1.31	1.20	1.06
15	2.31	2.09	1.76	1.63	1.52	1.42	1.20	1.08	0.991	0.877

Density in pounds per cubic foot. Pressure in pounds per square inch absolute.

Examples in the Use of the Table. Suppose it is required to find the discharge from a 5-inch pipe line, steam pressure being 120 pounds per square inch absolute, and the loss in pressure being 4.5 pounds per 1000 feet length. In Table II we find the drop 4.5 under 120 pounds pressure to be in line 9. In Table I in line 9 under 5-inch diameter we find the discharge to be 130 pounds per minute.

Or, suppose it is required to find the size of pipe to carry 1000 pounds of steam per minute, mean absolute pressure being 130 pounds and the drop in pressure being assumed as 11 pounds. In Table II the drop 11 under 130 pounds pressure is in line 2. In Table I in line 2 the tabular quantity which corresponds nearest to 1000 is in the 9-inch column. A 9-inch line will, therefore, be required.

Kent modifies Darcy's Formula for flow of water to make it apply to steam, and gives for the flow,

$$Q = c \sqrt{\frac{(p_1 - p_2)d^5}{wL}}$$

$$W = c \sqrt{\frac{w(p_1 - p_2)d^5}{L}}$$

where

Q = volume of steam in cubic feet per minute;

W = weight of steam in pounds per minute;

p_1 = initial pressure in pounds per square inch;

p_2 = final pressure in pounds per square inch;

L = length of pipe in feet;

d = inside diameter of pipe in inches;

w = density of steam in pounds per cubic foot;

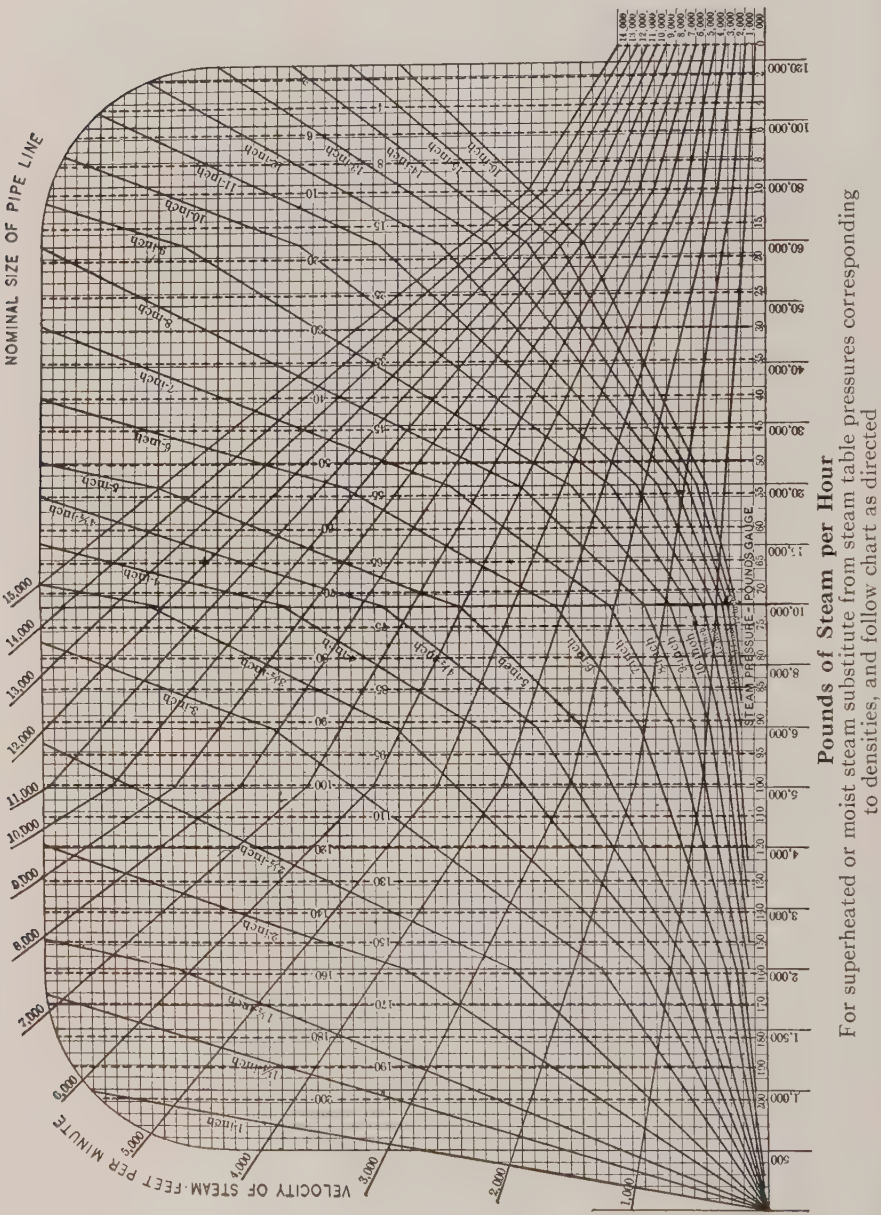
c = coefficient, depending on the diameter of the pipe.

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The values of *c* are as follows:

Nominal diameter, inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Value of <i>c</i>	36.8	42	45.3	48	50	52.7	54.8	56.2
Nominal diameter, inches	3 1/2	4	4 1/2	5	6	7	8	9
Value of <i>c</i>	57.1	57.8	58.3	58.7	59.5	60.2	60.8	61.3
Nominal diameter, inches	10	12	14	16	18	20	22	24
Value of <i>c</i>	61.7	62.1	62.3	62.6	62.7	62.9	63.2	63.2

DETERMINATION OF STEAM PIPE SIZES



DETERMINATION OF STEAM PIPE SIZES

The Velocity Chart on the opposite page is a great time-saver in calculating velocities, discharge and size of pipe required for given conditions of flow

Example No. 1—Allowing a velocity of 5000 feet per minute, what size of pipe is necessary to deliver 8000 pounds of steam per hour at 120 pounds gauge?

Solution—Trace 5000 foot velocity line to 120 pounds gauge. From intersection follow horizontally to 8000 pounds of steam per hour. Read nearest size of pipe, viz., 4 inches.

Example No. 2—Find velocity of steam in a 6-inch pipe delivering 20,000 pounds of steam per hour at 85 pounds gauge.

Solution—Trace the line representing 20,000 pounds per hour to intersect 6-inch pipe. Follow horizontally to 85 pounds gauge pressure and read 7350 feet per minute.

Example No. 3—Allowing a velocity of 6000 feet per minute through an 8-inch pipe, find the pounds of steam per hour at 100 pounds gauge

Solution—Trace the 6000 velocity line to intersect 100 pounds gauge line. Follow horizontally to 8-inch pipe line and read at that point 32,300 pounds of steam per hour.

Chart was developed by J. M. Spitzglass, Chief Engineer of Republic Flow Meters Co.

STEEL.

Weights of Flat Rolled Steel.

*Per Lineal Foot.*For thicknesses from $\frac{3}{16}$ in. to 2 in. and widths from 1 in. to 12 $\frac{1}{4}$ in.

Thickness inches.	1"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	1 $\frac{3}{4}$ "	2"	2 $\frac{1}{4}$ "	2 $\frac{1}{2}$ "	2 $\frac{3}{4}$ "	12"
$\frac{3}{16}$	.638	.797	.957	1.11	1.28	1.44	1.59	1.75	7.65
$\frac{1}{4}$	.850	1.06	1.28	1.49	1.70	1.91	2.12	2.34	10.20
$\frac{5}{16}$	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	12.75
$\frac{3}{8}$	1.28	1.59	1.92	2.23	2.55	2.87	3.19	3.51	15.30
$\frac{7}{16}$	1.49	1.86	2.23	2.60	2.98	3.35	3.72	4.09	17.85
$\frac{1}{2}$	1.70	2.12	2.55	2.98	3.40	3.83	4.25	4.67	20.40
$\frac{9}{16}$	1.92	2.39	2.87	3.35	3.83	4.30	4.78	5.26	22.95
$\frac{5}{8}$	2.12	2.65	3.19	3.72	4.25	4.78	5.31	5.84	25.50
$\frac{11}{16}$	2.34	2.92	3.51	4.09	4.67	5.26	5.84	6.43	28.05
$\frac{3}{4}$	2.55	3.19	3.83	4.47	5.10	5.75	6.38	7.02	30.60
$1\frac{1}{16}$	2.76	3.45	4.14	4.84	5.53	6.21	6.90	7.60	33.15
$\frac{7}{8}$	2.98	3.72	4.47	5.20	5.95	6.69	7.44	8.18	35.70
$1\frac{1}{8}$	3.19	3.99	4.78	5.58	6.38	7.18	7.97	8.77	38.25
1	3.40	4.25	5.10	5.95	6.80	7.65	8.50	9.35	40.80
$1\frac{1}{16}$	3.61	4.52	5.42	6.32	7.22	8.13	9.03	9.93	43.35
$1\frac{1}{8}$	3.83	4.78	5.74	6.70	7.65	8.61	9.57	10.52	45.90
$1\frac{3}{16}$	4.04	5.05	6.06	7.07	8.08	9.09	10.10	11.11	48.45
$1\frac{1}{4}$	4.25	5.31	6.38	7.44	8.50	9.57	10.63	11.69	51.00
$1\frac{5}{16}$	4.46	5.58	6.69	7.81	8.93	10.04	11.16	12.27	53.55
$1\frac{3}{8}$	4.67	5.84	7.02	8.18	9.35	10.52	11.69	12.85	56.10
$1\frac{7}{16}$	4.89	6.11	7.34	8.56	9.78	11.00	12.22	13.44	58.65
$1\frac{1}{2}$	5.10	6.38	7.65	8.93	10.20	11.48	12.75	14.03	61.20
$1\frac{9}{16}$	5.32	6.64	7.97	9.30	10.63	11.95	13.28	14.61	63.75
$1\frac{5}{8}$	5.52	6.90	8.29	9.67	11.05	12.43	13.81	15.19	66.30
$1\frac{11}{16}$	5.74	7.17	8.61	10.04	11.47	12.91	14.34	15.78	68.85
$1\frac{3}{4}$	5.95	7.44	8.93	10.42	11.90	13.40	14.88	16.37	71.40
$1\frac{13}{16}$	6.16	7.70	9.24	10.79	12.33	13.86	15.40	16.95	73.95
$1\frac{7}{8}$	6.38	7.97	9.57	11.15	12.75	14.34	15.94	17.53	76.50
$1\frac{15}{16}$	6.59	8.24	9.88	11.53	13.18	14.83	16.47	18.12	79.05
2	6.80	8.50	10.20	11.90	13.60	15.30	17.00	18.70	81.60

STEEL.

Weights of Flat Rolled Steel.

Per Lineal Foot.

(CONTINUED.)

Thick- ness in Inches.	3"	3¼"	3½"	3¾"	4"	4¼"	4½"	4¾"	12"
$\frac{3}{16}$	1.91	2.07	2.23	2.39	2.55	2.71	2.87	3.03	7.65
$\frac{1}{4}$	2.55	2.76	2.98	3.19	3.40	3.61	3.83	4.04	10.20
$\frac{5}{16}$	3.19	3.45	3.72	3.99	4.25	4.52	4.78	5.05	12.75
$\frac{3}{8}$	3.83	4.15	4.47	4.78	5.10	5.42	5.74	6.06	15.30
$\frac{7}{16}$	4.46	4.83	5.20	5.58	5.95	6.32	6.70	7.07	17.85
$\frac{1}{2}$	5.10	5.53	5.95	6.38	6.80	7.22	7.65	8.08	20.40
$\frac{9}{16}$	5.74	6.22	6.70	7.17	7.65	8.13	8.61	9.09	22.95
$\frac{5}{8}$	6.38	6.91	7.44	7.97	8.50	9.03	9.57	10.10	25.50
$\frac{11}{16}$	7.02	7.60	8.18	8.76	9.35	9.93	10.52	11.11	28.05
$\frac{3}{4}$	7.65	8.29	8.93	9.57	10.20	10.84	11.48	12.12	30.60
$\frac{13}{16}$	8.29	8.98	9.67	10.36	11.05	11.74	12.43	13.12	33.15
$\frac{7}{8}$	8.93	9.67	10.41	11.16	11.90	12.65	13.39	14.13	35.70
$\frac{15}{16}$	9.57	10.36	11.16	11.95	12.75	13.55	14.34	15.14	38.25
1	10.20	11.05	11.90	12.75	13.60	14.45	15.30	16.15	40.80
$1\frac{1}{16}$	10.84	11.74	12.65	13.55	14.45	15.35	16.26	17.16	43.35
$1\frac{1}{8}$	11.48	12.43	13.39	14.34	15.30	16.26	17.22	18.17	45.90
$1\frac{3}{16}$	12.12	13.12	14.13	15.14	16.15	17.16	18.17	19.18	48.45
$1\frac{1}{4}$	12.75	13.81	14.87	15.94	17.00	18.06	19.13	20.19	51.00
$1\frac{5}{16}$	13.39	14.50	15.62	16.74	17.85	18.96	20.08	21.20	53.55
$1\frac{3}{8}$	14.03	15.20	16.36	17.53	18.70	19.87	21.04	22.21	56.10
$1\frac{7}{16}$	14.66	15.88	17.10	18.33	19.55	20.77	21.99	23.22	58.65
$1\frac{1}{2}$	15.30	16.58	17.85	19.13	20.40	21.68	22.95	24.23	61.20
$1\frac{9}{16}$	15.94	17.27	18.60	19.92	21.25	22.58	23.91	25.24	63.75
$1\frac{5}{8}$	16.58	17.96	19.34	20.72	22.10	23.48	24.87	26.25	66.30
$1\frac{11}{16}$	17.22	18.65	20.08	21.51	22.95	24.38	25.82	27.26	68.85
$1\frac{3}{4}$	17.85	19.34	20.83	22.32	23.80	25.29	26.78	28.27	71.40
$1\frac{13}{16}$	18.49	20.03	21.57	23.11	24.65	26.19	27.73	29.27	73.95
$1\frac{7}{8}$	19.13	20.72	22.31	23.91	25.50	27.10	28.69	30.28	76.50
$1\frac{15}{16}$	19.77	21.41	23.06	24.70	26.35	28.00	29.64	31.29	79.05
2	20.40	22.10	23.80	25.50	27.20	28.90	30.60	32.30	81.60

STEEL.

Weights of Flat Rolled Steel.

Per Lineal Foot.

(CONTINUED.)

Thick- ness in Inches.	5"	5¼"	5½"	5¾"	6"	6¼"	6½"	6¾"	12"
$\frac{3}{16}$	3.19	3.35	3.51	3.67	3.83	3.99	4.14	4.30	7.65
$\frac{1}{4}$	4.25	4.46	4.67	4.89	5.10	5.31	5.53	5.74	10.20
$\frac{5}{16}$	5.31	5.58	5.84	6.11	6.38	6.64	6.90	7.17	12.75
$\frac{3}{8}$	6.38	6.69	7.02	7.34	7.65	7.97	8.29	8.61	15.30
$\frac{7}{16}$	7.44	7.81	8.18	8.56	8.93	9.29	9.67	10.04	17.85
$\frac{1}{2}$	8.50	8.93	9.35	9.77	10.20	10.63	11.05	11.48	20.40
$\frac{9}{16}$	9.57	10.04	10.52	11.00	11.48	11.95	12.43	12.91	22.95
$\frac{5}{8}$	10.63	11.16	11.69	12.22	12.75	13.28	13.81	14.34	25.50
$\frac{11}{16}$	11.69	12.27	12.85	13.44	14.03	14.61	15.20	15.78	28.05
$\frac{3}{4}$	12.75	13.39	14.03	14.67	15.30	15.94	16.58	17.22	30.60
$1\frac{1}{16}$	13.81	14.50	15.19	15.88	16.58	17.27	17.95	18.65	33.15
$\frac{7}{8}$	14.87	15.62	16.36	17.10	17.85	18.60	19.34	20.08	35.70
$1\frac{1}{8}$	15.94	16.74	17.53	18.33	19.13	19.92	20.72	21.51	38.25
1	17.00	17.85	18.70	19.55	20.40	21.25	22.10	22.95	40.80
$1\frac{1}{16}$	18.06	18.96	19.87	20.77	21.68	22.58	23.48	24.39	43.35
$1\frac{1}{8}$	19.13	20.08	21.04	21.99	22.95	23.91	24.87	25.82	45.90
$1\frac{3}{16}$	20.19	21.20	22.21	23.22	24.23	25.23	26.24	27.25	48.45
$1\frac{1}{4}$	21.25	22.32	23.38	24.44	25.50	26.56	27.62	28.69	51.00
$1\frac{5}{16}$	22.32	23.43	24.54	25.66	26.78	27.90	29.01	30.12	53.55
$1\frac{3}{8}$	23.38	24.54	25.71	26.88	28.05	29.22	30.39	31.56	56.10
$1\frac{7}{16}$	24.44	25.66	26.88	28.10	29.33	30.55	31.77	32.99	58.65
$1\frac{1}{2}$	25.50	26.78	28.05	29.33	30.60	31.88	33.15	34.43	61.20
$1\frac{9}{16}$	26.57	27.89	29.22	30.55	31.88	33.20	34.53	35.86	63.75
$1\frac{5}{8}$	27.63	29.01	30.39	31.77	33.15	34.53	35.91	37.29	66.30
$1\frac{11}{16}$	28.69	30.12	31.55	32.99	34.43	35.86	37.30	38.73	68.85
$1\frac{3}{4}$	29.75	31.24	32.73	34.22	35.70	37.19	38.68	40.17	71.40
$1\frac{13}{16}$	30.81	32.35	33.89	35.43	36.98	38.52	40.05	41.60	73.95
$1\frac{7}{8}$	31.87	33.47	35.06	36.65	38.25	39.85	41.44	43.03	76.50
$1\frac{15}{16}$	32.94	34.59	36.23	37.88	39.53	41.17	42.82	44.46	79.05
2	34.00	35.70	37.40	39.10	40.80	42.50	44.20	45.90	81.60

STEEL.

Weights of Flat Rolled Steel.

Per Lineal Foot.

(CONTINUED.)

Thick- ness in inches.	7"	7¼"	7½"	7¾"	8"	8¼"	8½"	8¾"	12"
$\frac{3}{16}$	4.46	4.62	4.78	4.94	5.10	5.26	5.42	5.58	7.65
$\frac{1}{4}$	5.95	6.16	6.36	6.58	6.80	7.01	7.22	7.43	10.20
$\frac{5}{16}$	7.44	7.70	7.97	8.23	8.50	8.76	9.03	9.29	12.75
$\frac{3}{8}$	8.93	9.25	9.57	9.88	10.20	10.52	10.84	11.16	15.30
$\frac{7}{16}$	10.41	10.78	11.16	11.53	11.90	12.27	12.64	13.02	17.85
$\frac{1}{2}$	11.90	12.32	12.75	13.18	13.60	14.03	14.44	14.87	20.40
$\frac{9}{16}$	13.39	13.86	14.34	14.82	15.30	15.78	16.26	16.74	22.95
$\frac{5}{8}$	14.87	15.40	15.94	16.47	17.00	17.53	18.06	18.59	25.50
$\frac{11}{16}$	16.36	16.94	17.53	18.12	18.70	19.28	19.86	20.45	28.05
$\frac{3}{4}$	17.85	18.49	19.13	19.77	20.40	21.04	21.68	22.32	30.60
$1\frac{1}{16}$	19.34	20.03	20.72	21.41	22.10	22.79	23.48	24.17	33.15
$1\frac{1}{8}$	20.83	21.57	22.32	23.05	23.80	24.55	25.30	26.04	35.70
$1\frac{1}{4}$	22.32	23.11	23.91	24.70	25.50	26.30	27.10	27.89	38.25
1	23.80	24.65	25.50	26.35	27.20	28.05	28.90	29.75	40.80
$1\frac{1}{16}$	25.29	26.19	27.10	28.00	28.90	29.80	30.70	31.61	43.35
$1\frac{1}{8}$	26.78	27.73	28.68	29.64	30.60	31.56	32.52	33.47	45.90
$1\frac{3}{8}$	28.26	29.27	30.28	31.29	32.30	33.31	34.32	35.33	48.45
$1\frac{1}{4}$	29.75	30.81	31.88	32.94	34.00	35.06	36.12	37.20	51.00
$1\frac{5}{16}$	31.23	32.35	33.48	34.59	35.70	36.81	37.93	39.05	53.55
$1\frac{3}{8}$	32.72	33.89	35.06	36.23	37.40	38.57	39.74	40.91	56.10
$1\frac{7}{16}$	34.21	35.44	36.66	37.88	39.10	40.32	41.54	42.77	58.65
$1\frac{1}{2}$	35.70	36.98	38.26	39.53	40.80	42.08	43.35	44.63	61.20
$1\frac{9}{16}$	37.19	38.51	39.84	41.17	42.50	43.83	45.16	46.49	63.75
$1\frac{5}{8}$	38.67	40.05	41.44	42.82	44.20	45.58	46.96	48.34	66.30
$1\frac{11}{16}$	40.16	41.59	43.03	44.47	45.90	47.33	48.76	50.20	68.85
$1\frac{3}{4}$	41.65	43.14	44.63	46.12	47.60	49.09	50.58	52.07	71.40
$1\frac{13}{16}$	43.14	44.68	46.22	47.76	49.30	50.84	52.38	53.92	73.95
$1\frac{7}{8}$	44.63	46.22	47.82	49.40	51.00	52.60	54.20	55.79	76.50
$1\frac{15}{16}$	46.12	47.76	49.41	51.05	52.70	54.35	56.00	57.64	79.05
2	47.60	49.30	51.00	52.70	54.40	56.10	57.80	59.50	81.60

STEEL.

Weights of Flat Rolled Steel.

Per Lineal Foot.

(CONTINUED.)

Thick- ness in inches.	9"	9¼"	9½"	9¾"	10"	10¼"	10½"	10¾"	12"
$\frac{3}{16}$	5.74	5.90	6.06	6.22	6.38	6.54	6.70	6.86	7.65
$\frac{1}{4}$	7.65	7.86	8.08	8.29	8.50	8.71	8.92	9.14	10.20
$\frac{5}{16}$	9.56	9.83	10.10	10.36	10.62	10.89	11.16	11.42	12.75
$\frac{3}{8}$	11.48	11.80	12.12	12.44	12.75	13.07	13.39	13.71	15.30
$\frac{7}{16}$	13.40	13.76	14.14	14.51	14.88	15.25	15.62	15.99	17.85
$\frac{1}{2}$	15.30	15.73	16.16	16.58	17.00	17.42	17.85	18.28	20.40
$\frac{9}{16}$	17.22	17.69	18.18	18.65	19.14	19.61	20.08	20.56	22.95
$\frac{5}{8}$	19.13	19.65	20.19	20.72	21.25	21.78	22.32	22.85	25.50
$\frac{11}{16}$	21.04	21.62	22.21	22.79	23.38	23.96	24.54	25.13	28.05
$\frac{3}{4}$	22.96	23.59	24.23	24.86	25.50	26.14	26.78	27.42	30.60
$\frac{13}{16}$	24.86	25.55	26.24	26.94	27.62	28.32	29.00	29.69	33.15
$\frac{7}{8}$	26.78	27.52	28.26	29.01	29.75	30.50	31.24	31.98	35.70
$\frac{15}{16}$	28.69	29.49	30.28	31.08	31.88	32.67	33.48	34.28	38.25
1	30.60	31.45	32.30	33.15	34.00	34.85	35.70	36.55	40.80
$1\frac{1}{16}$	32.52	33.41	34.32	35.22	36.12	37.03	37.92	38.83	43.35
$1\frac{1}{8}$	34.43	35.38	36.34	37.29	38.25	39.21	40.17	41.12	45.90
$1\frac{3}{16}$	36.34	37.35	38.36	39.37	40.38	41.39	42.40	43.40	48.45
$1\frac{1}{4}$	38.26	39.31	40.37	41.44	42.50	43.56	44.63	45.69	51.00
$1\frac{5}{16}$	40.16	41.28	42.40	43.52	44.64	45.75	46.86	47.97	53.55
$1\frac{3}{8}$	42.08	43.25	44.41	45.58	46.75	47.92	49.08	50.25	56.10
$1\frac{7}{16}$	44.00	45.22	46.44	47.66	48.88	50.10	51.32	52.54	58.65
$1\frac{1}{2}$	45.90	47.18	48.45	49.73	51.00	52.28	53.55	54.83	61.20
$1\frac{9}{16}$	47.82	49.14	50.48	51.80	53.14	54.46	55.78	57.11	63.75
$1\frac{5}{8}$	49.73	51.10	52.49	53.87	55.25	56.63	58.02	59.40	66.30
$1\frac{11}{16}$	51.64	53.07	54.51	55.94	57.38	58.81	60.24	61.68	68.85
$1\frac{3}{4}$	53.56	55.04	56.53	58.01	59.50	60.99	62.48	63.97	71.40
$1\frac{13}{16}$	55.46	57.00	58.54	60.09	61.62	63.17	64.70	66.24	73.95
$1\frac{7}{8}$	57.38	58.97	60.56	62.16	63.75	65.35	66.94	68.53	76.50
$1\frac{15}{16}$	59.29	60.94	62.58	64.23	65.88	67.52	69.18	70.83	79.05
2	61.20	62.90	64.60	66.30	68.00	69.70	71.40	73.10	81.60

STEEL.

Weights of Flat Rolled Steel.

Per Lineal Foot.

(CONTINUED.)

Thick- ness in inches.	11 "	11 ¼ "	11 ½ "	11 ¾ "	12 "	12 ¼ "	12 ½ "	12 ¾ "
$\frac{3}{16}$	7.02	7.17	7.32	7.49	7.65	7.82	7.98	8.13
$\frac{1}{4}$	9.34	9.57	9.78	10.00	10.20	10.42	10.63	10.84
$\frac{5}{16}$	11.68	11.95	12.22	12.49	12.75	13.01	13.28	13.55
$\frac{3}{8}$	14.03	14.35	14.68	14.99	15.30	15.62	15.94	16.26
$\frac{7}{16}$	16.36	16.74	17.12	17.49	17.85	18.23	18.60	18.97
$\frac{1}{2}$	18.70	19.13	19.55	19.97	20.40	20.82	21.25	21.67
$\frac{9}{16}$	21.02	21.51	22.00	22.48	22.95	23.43	23.90	24.39
$\frac{5}{8}$	23.38	23.91	24.44	24.97	25.50	26.03	26.56	27.09
$\frac{11}{16}$	25.70	26.30	26.88	27.47	28.05	28.64	29.22	29.80
$\frac{3}{4}$	28.05	28.68	29.33	29.97	30.60	31.25	31.88	32.52
$1\frac{1}{16}$	30.40	31.08	31.76	32.46	33.15	33.83	34.53	35.22
$\frac{7}{8}$	32.72	33.47	34.21	34.95	35.70	36.44	37.19	37.93
$1\frac{1}{8}$	35.06	35.86	36.66	37.46	38.25	39.05	39.84	40.64
1	37.40	38.25	39.10	39.95	40.80	41.65	42.50	43.35
$1\frac{1}{16}$	39.74	40.64	41.54	42.45	43.35	44.25	45.16	46.06
$1\frac{1}{8}$	42.08	43.04	44.00	44.94	45.90	46.86	47.82	48.77
$1\frac{3}{16}$	44.42	45.42	46.44	47.45	48.45	49.46	50.46	51.48
$1\frac{1}{4}$	46.76	47.82	48.88	49.94	51.00	52.06	53.12	54.19
$1\frac{5}{16}$	49.08	50.20	51.32	52.44	53.55	54.67	55.78	56.90
$1\frac{3}{8}$	51.42	52.59	53.76	54.93	56.10	57.27	58.44	59.60
$1\frac{7}{16}$	53.76	54.99	56.21	57.43	58.65	59.87	61.10	62.32
$1\frac{1}{2}$	56.10	57.37	58.65	59.93	61.20	62.48	63.75	65.03
$1\frac{9}{16}$	58.42	59.76	61.10	62.43	63.75	65.08	66.40	67.74
$1\frac{5}{8}$	60.78	62.16	63.54	64.92	66.30	67.68	69.06	70.44
$1\frac{11}{16}$	63.10	64.55	65.98	67.42	68.85	70.29	71.72	73.15
$1\frac{3}{4}$	65.45	66.93	68.43	69.92	71.40	72.90	74.38	75.87
$1\frac{13}{16}$	67.80	69.33	70.86	72.41	73.95	75.48	77.03	78.57
$1\frac{7}{8}$	70.12	71.72	73.31	74.90	76.50	78.09	79.69	81.28
$1\frac{15}{16}$	72.46	74.11	75.76	77.41	79.05	80.70	82.34	83.99
2	74.80	76.50	78.20	79.90	81.60	83.30	85.00	86.70

The weights for 12" width are repeated on each page to facilitate making the additions necessary to obtain the weights of plates wider than 12". Thus to find the weight of 15½" × ½", add the weights to be found in the same line for ¾" × ½" and 12" × ½" = 10.41 + 35.70 = 46.11 lbs.

**Weights and Areas of Square and Round Steel,
also Circumference of Round Bars.**

Assuming one cubic foot to weigh 490 lbs.

Thickness or Diameter in Inches.	Weight of Square Bar 1 ft. long.	Weight of Round Bar 1 ft. long.	Area of Square Bar in Square Inches.	Area of Round Bar in Square Inches.	Circum- ference of Round Bar in Inches.
$\frac{3}{16}$	.120	.094	.0352	.0276	.5890
$\frac{1}{4}$	.213	.167	.0625	.0491	.7854
$\frac{5}{16}$	.332	.261	.0977	.0767	.9817
$\frac{3}{8}$	.478	.375	.1406	.1104	1.1781
$\frac{7}{16}$	.651	.511	.1914	.1503	1.3744
$\frac{1}{2}$	.851	.668	.2500	.1963	1.5708
$\frac{9}{16}$	1.076	.845	.3164	.2485	1.7671
$\frac{5}{8}$	1.329	1.044	.3906	.3068	1.9635
$\frac{11}{16}$	1.608	1.263	.4727	.3712	2.1598
$\frac{3}{4}$	1.914	1.503	.5625	.4418	2.3562
$\frac{13}{16}$	2.246	1.764	.6602	.5185	2.5525
$\frac{7}{8}$	2.605	2.046	.7656	.6013	2.7489
$\frac{15}{16}$	2.990	2.348	.8789	.6903	2.9452
1	3.402	2.672	1.0000	.7854	3.1416
$\frac{1}{16}$	3.841	3.017	1.1289	.8866	3.3379
$\frac{1}{8}$	4.306	3.382	1.2656	.9940	3.5343
$\frac{3}{16}$	4.798	3.768	1.4102	1.1075	3.7306
$\frac{1}{4}$	5.316	4.175	1.5625	1.2272	3.9270
$\frac{5}{16}$	5.861	4.603	1.7227	1.3530	4.1233
$\frac{3}{8}$	6.432	5.052	1.8906	1.4849	4.3197
$\frac{7}{16}$	7.030	5.521	2.0664	1.6230	4.5160
$\frac{1}{2}$	7.655	6.012	2.2500	1.7671	4.7124
$\frac{9}{16}$	8.306	6.524	2.4414	1.9175	4.9087
$\frac{5}{8}$	8.984	7.056	2.6406	2.0739	5.1051
$\frac{11}{16}$	9.688	7.609	2.8477	2.2365	5.3014
$\frac{3}{4}$	10.419	8.183	3.0625	2.4053	5.4978
$\frac{13}{16}$	11.177	8.778	3.2852	2.5802	5.6941
$\frac{7}{8}$	11.961	9.394	3.5156	2.7612	5.8905
$\frac{15}{16}$	12.772	10.031	3.7539	2.9483	6.0868

**Weights and Areas of Square and Round Steel,
also Circumference of Round Bars.**

Assuming one cubic foot to weigh 490 lbs.

Thickness or Diameter in-Inches.	Weight of Square Bar 1 ft. long.	Weight of Round Bar 1 ft. long.	Area of Square Bar in Square Inches.	Area of Round Bar in Square Inches.	Circum- ference of Round Bar in Inches.
2	13.61	10.69	4.0000	3.1416	6.2832
$\frac{1}{16}$	14.47	11.36	4.2539	3.3410	6.4795
$\frac{1}{8}$	15.36	12.06	4.5156	3.5466	6.6759
$\frac{3}{16}$	16.28	12.79	4.7852	3.7583	6.8722
$\frac{1}{4}$	17.22	13.52	5.0625	3.9761	7.0686
$\frac{5}{16}$	18.19	14.29	5.3477	4.2000	7.2649
$\frac{3}{8}$	19.19	15.07	5.6406	4.4301	7.4613
$\frac{7}{16}$	20.21	15.87	5.9414	4.6664	7.6576
$\frac{1}{2}$	21.26	16.70	6.2500	4.9087	7.8540
$\frac{9}{16}$	22.34	17.55	6.5664	5.1572	8.0503
$\frac{5}{8}$	23.44	18.41	6.8906	5.4119	8.2467
$\frac{11}{16}$	24.57	19.30	7.2227	5.6727	8.4430
$\frac{3}{4}$	25.73	20.21	7.5625	5.9396	8.6394
$\frac{13}{16}$	26.91	21.14	7.9102	6.2126	8.8357
$\frac{7}{8}$	28.12	22.09	8.2656	6.4918	9.0321
$\frac{15}{16}$	29.36	23.06	8.6289	6.7771	9.2284
3	30.62	24.05	9.0000	7.0686	9.4248
$\frac{1}{16}$	31.91	25.06	9.3789	7.3662	9.6211
$\frac{1}{8}$	33.23	26.10	9.7656	7.6699	9.8175
$\frac{3}{16}$	34.57	27.15	10.160	7.9798	10.014
$\frac{1}{4}$	35.94	28.23	10.563	8.2958	10.210
$\frac{5}{16}$	37.33	29.32	10.973	8.6179	10.407
$\frac{3}{8}$	38.75	30.43	11.391	8.9462	10.603
$\frac{7}{16}$	40.20	31.57	11.816	9.2806	10.799
$\frac{1}{2}$	41.68	32.74	12.250	9.6211	10.996
$\frac{9}{16}$	43.17	33.91	12.691	9.9678	11.192
$\frac{5}{8}$	44.71	35.12	13.141	10.321	11.388
$\frac{11}{16}$	46.26	36.33	13.598	10.680	11.585
$\frac{3}{4}$	47.84	37.57	14.063	11.045	11.781
$\frac{13}{16}$	49.45	38.84	14.535	11.416	11.977
$\frac{7}{8}$	51.09	40.13	15.016	11.793	12.174
$\frac{15}{16}$	52.75	41.43	15.504	12.177	12.370

Weights and Areas of Square and Round Steel, also Circumference of Round Bars.

Assuming one cubic foot to weigh 490 lbs.

Thickness or Diameter in Inches.	Weight of Square Bar 1 ft. long.	Weight of Round Bar 1 ft. long.	Area of Square Bar in Square Inches.	Area of Round Bar in Square Inches.	Circum- ference of Round Bar in Inches.
4	54.45	42.77	16.000	12.566	12.566
$\frac{1}{8}$	57.90	45.47	17.016	13.364	12.959
$\frac{1}{4}$	61.47	48.28	18.063	14.186	13.352
$\frac{3}{8}$	65.13	51.15	19.141	15.033	13.744
$\frac{1}{2}$	69.81	54.83	20.250	15.904	14.137
$\frac{5}{8}$	72.79	57.17	21.391	16.800	14.530
$\frac{3}{4}$	76.78	60.30	22.563	17.721	14.923
$\frac{7}{8}$	80.87	63.52	23.766	18.665	15.315
5	85.08	66.82	25.000	19.635	15.708
$\frac{1}{8}$	89.38	70.20	26.266	20.629	16.101
$\frac{1}{4}$	93.80	73.67	27.563	21.648	16.493
$\frac{3}{8}$	98.31	77.21	28.891	22.691	16.886
$\frac{1}{2}$	102.94	80.85	30.250	23.758	17.279
$\frac{5}{8}$	107.67	84.56	31.641	24.850	17.671
$\frac{3}{4}$	112.52	88.37	33.063	25.967	18.064
$\frac{7}{8}$	117.45	92.25	34.516	27.109	18.457
6	122.51	96.22	36.000	28.274	18.850
$\frac{1}{8}$	127.66	100.26	37.516	29.465	19.242
$\frac{1}{4}$	132.94	104.41	39.063	30.680	19.635
$\frac{3}{8}$	138.30	108.62	40.641	31.919	20.028
$\frac{1}{2}$	143.78	112.92	42.250	33.183	20.420
$\frac{5}{8}$	149.35	117.30	43.891	34.472	20.813
$\frac{3}{4}$	155.05	121.78	45.563	35.785	21.206
$\frac{7}{8}$	160.84	125.32	47.266	37.122	21.598
7	166.75	130.97	49.000	38.485	21.991
$\frac{1}{8}$	172.75	135.68	50.766	39.871	22.384
$\frac{1}{4}$	178.87	140.48	52.563	41.282	22.777
$\frac{3}{8}$	185.08	145.36	54.391	42.718	23.169
$\frac{1}{2}$	191.42	150.34	56.250	44.179	23.562
$\frac{5}{8}$	197.85	155.39	58.141	45.664	23.955
$\frac{3}{4}$	204.39	160.53	60.063	47.173	24.347
$\frac{7}{8}$	211.03	165.74	62.016	48.707	24.740

**Weights and Areas of Square and Round Steel,
also Circumference of Round Bars.**

Assuming one cubic foot to weigh 490 lbs.

Thickness or Diameter in Inches.	Weight of Square Bar 1 ft. long.	Weight of Round Bar 1 ft. long.	Area of Square Bar in Square Inches.	Area of Round Bar in Square Inches.	Circum- ference of Round Bar in Inches.
8	217.78	171.04	64.000	50.265	25.133
$\frac{1}{8}$	224.64	176.43	66.016	51.849	25.525
$\frac{1}{4}$	231.61	181.91	68.063	53.456	25.918
$\frac{3}{8}$	238.68	187.46	70.141	55.088	26.311
$\frac{1}{2}$	245.86	193.10	72.250	56.745	26.704
$\frac{5}{8}$	253.14	198.82	74.391	58.426	27.096
$\frac{3}{4}$	260.54	204.63	76.593	60.132	27.489
$\frac{7}{8}$	268.03	210.51	78.766	61.862	27.882
9	275.64	216.49	81.000	63.617	28.274
$\frac{1}{8}$	283.34	222.54	83.266	65.397	28.667
$\frac{1}{4}$	291.16	228.68	85.563	67.201	29.060
$\frac{3}{8}$	299.08	234.90	87.891	69.029	29.452
$\frac{1}{2}$	307.11	241.20	90.250	70.882	29.845
$\frac{5}{8}$	315.24	247.59	92.641	72.760	30.238
$\frac{3}{4}$	323.49	254.07	95.063	74.662	30.631
$\frac{7}{8}$	331.83	260.62	97.516	76.589	31.023
10	340.29	267.16	100.00	78.540	31.416
$\frac{1}{8}$	348.85	273.99	102.52	80.516	31.809
$\frac{1}{4}$	357.52	280.80	105.06	82.516	32.201
$\frac{3}{8}$	366.29	287.68	107.64	84.541	32.594
$\frac{1}{2}$	375.17	294.66	110.25	86.590	32.987
$\frac{5}{8}$	384.15	301.71	112.89	88.664	33.379
$\frac{3}{4}$	393.25	308.86	115.56	90.763	33.772
$\frac{7}{8}$	402.44	316.08	118.27	92.886	34.165
11	411.75	323.39	121.00	95.033	34.558
$\frac{1}{8}$	421.16	330.78	123.77	97.205	34.950
$\frac{1}{4}$	430.68	338.26	126.56	99.402	35.343
$\frac{3}{8}$	440.30	345.81	129.39	101.62	35.739
$\frac{1}{2}$	450.03	353.45	132.25	103.87	36.128
$\frac{5}{8}$	459.87	361.18	135.14	106.14	36.521
$\frac{3}{4}$	469.81	368.99	138.06	108.43	36.914
$\frac{7}{8}$	479.86	376.88	141.02	110.75	37.306

STANDARD GAUGES

No. of Gauge.	THICKNESS IN DECIMALS OF AN INCH							No. of gauge
	Birm- ingham	Browne & Sharpe	United States Standard Plate Iron and Steel	British Imperial	American Steel & Wire Co.	Trenton Iron Co.	Stubs Steel Wire	
70	.....	.....	.500	.500	.....	.....	.....	70
60	.....	.....	.46875	.464	.....	.....	.....	60
50	.....	.....	.4375	.432	.....	.....	.....	50
40	.454	.46	.40625	.400	.3938	.45	.....	40
30	.425	.40964	.375	.372	.3625	.40	.....	30
20	.380	.3648	.34375	.348	.3310	.33	.....	20
0	.340	.32486	.3125	.324	.3065	.305	.....	0
1	.300	.2893	.28125	.300	.2830	.285	.227	1
2	.284	.25763	.265625	.278	.2625	.265	.219	2
3	.259	.22942	.25	.252	.2437	.245	.212	3
4	.238	.20431	.234375	.232	.2253	.225	.207	4
5	.220	.18194	.21875	.212	.2070	.205	.204	5
6	.203	.16202	.203125	.192	.1920	.190	.201	6
7	.180	.14428	.1875	.178	.1770	.175	.199	7
8	.165	.12849	.171875	.160	.1620	.160	.197	8
9	.148	.11443	.15625	.144	.1483	.145	.194	9
10	.134	.10189	.140625	.128	.1350	.130	.191	10
11	.120	.090742	.125	.116	.1205	.1175	.188	11
12	.109	.080808	.109375	.104	.1055	.1050	.185	12
13	.095	.071961	.09375	.092	.0915	.0925	.182	13
14	.083	.064084	.078125	.080	.0800	.0800	.180	14
15	.072	.057068	.0703125	.072	.0720	.0700	.178	15
16	.065	.05082	.0625	.064	.0625	.0610	.175	16
17	.058	.045257	.05625	.056	.0540	.0525	.172	17
18	.049	.040303	.05	.048	.0475	.0450	.168	18
19	.042	.03589	.04375	.040	.0410	.0400	.164	19
20	.035	.031961	.0375	.036	.0348	.0350	.161	20
21	.032	.028462	.034375	.032	.03175	.0310	.157	21
22	.028	.025347	.03125	.028	.0286	.0280	.155	22
23	.025	.022571	.028125	.024	.0258	.0250	.153	23
24	.022	.0201	.025	.022	.0230	.0225	.151	24
25	.020	.0179	.021875	.020	.0204	.0200	.148	25
26	.018	.01594	.01875	.018	.0181	.0180	.146	26
27	.016	.014195	.0171875	.0164	.0173	.0170	.143	27
28	.014	.012641	.015625	.0148	.0162	.0160	.139	28
29	.013	.011257	.0140625	.0136	.0150	.0150	.134	29
30	.012	.010025	.0125	.0124	.0140	.0140	.127	30
31	.010	.008928	.0109375	.0116	.0132	.0130	.120	31
32	.009	.00795	.01015625	.0108	.0128	.0120	.115	32
33	.008	.00708	.009375	.0100	.0118	.0110	.112	33
34	.007	.006304	.00859375	.0092	.0104	.0100	.110	34
35	.005	.005614	.0078125	.0084	.0095	.0095	.108	35
36	.004	.005	.00703125	.0076	.0090	.0090	.106	36
37	.....	.004453	.006640625	.0068	.....	.0085	.103	37
38	.....	.003965	.00625	.0060	.....	.0080	.101	38
39	.....	.003531	.....	.....	.....	.0075	.099	39
40	.....	.003144	.....	.....	.....	.0070	.097	40

**SQUARES, CUBES, SQUARE ROOTS AND CUBE
ROOTS OF NUMBERS FROM .1 TO 1600.**

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
.1	.01	.001	.3162	.4642	3.1	9.61	29.791	1.761	1.458
.15	.0225	.0034	.3873	.5313	.2	10.24	32.768	1.789	1.474
.2	.04	.008	.4472	.5848	.3	10.89	35.937	1.817	1.489
.25	.0625	.0156	.500	.6300	.4	11.56	39.304	1.844	1.504
.3	.09	.027	.5477	.6694	.5	12.25	42.875	1.871	1.518
.35	.1225	.0429	.5916	.7047	.6	12.96	46.656	1.897	1.533
.4	.16	.064	.6325	.7368	.7	13.69	50.653	1.924	1.547
.45	.2025	.0911	.6708	.7663	.8	14.44	54.872	1.949	1.560
.5	.25	.125	.7071	.7937	.9	15.21	59.319	1.975	1.574
.55	.3025	.1664	.7416	.8193	4.	16.	64.	2.	1.5874
.6	.36	.216	.7746	.8434	.1	16.81	68.921	2.025	1.601
.65	.4225	.2746	.8062	.8662	.2	17.64	74.088	2.049	1.613
.7	.49	.343	.8367	.8879	.3	18.49	79.507	2.074	1.626
.75	.5625	.4219	.8660	.9086	.4	19.36	85.184	2.098	1.639
.8	.64	.512	.8944	.9283	.5	20.25	91.125	2.121	1.651
.85	.7225	.6141	.9219	.9473	.6	21.16	97.336	2.145	1.663
.9	.81	.729	.9487	.9655	.7	22.09	103.823	2.168	1.675
.95	.9025	.8574	.9747	.9830	.8	23.04	110.592	2.191	1.687
1.	1.	1.	1.	1.	.9	24.01	117.649	2.214	1.698
1.05	1.1025	1.158	1.025	1.016	5.	25.	125.	2.2361	1.7100
1.1	1.21	1.331	1.049	1.032	.1	26.01	132.651	2.258	1.721
1.15	1.3225	1.521	1.072	1.048	.2	27.04	140.608	2.280	1.732
1.2	1.44	1.728	1.095	1.063	.3	28.09	148.877	2.302	1.744
1.25	1.5625	1.953	1.118	1.077	.4	29.16	157.464	2.324	1.754
1.3	1.69	2.197	1.140	1.091	.5	30.25	166.375	2.345	1.765
1.35	1.8225	2.460	1.162	1.105	.6	31.36	175.616	2.366	1.776
1.4	1.96	2.744	1.183	1.119	.7	32.49	185.193	2.387	1.786
1.45	2.1025	3.049	1.204	1.132	.8	33.64	195.112	2.408	1.797
1.5	2.25	3.375	1.2247	1.1447	.9	34.81	205.379	2.429	1.807
1.55	2.4025	3.724	1.245	1.157	6.	36.	216.	2.4495	1.8171
1.6	2.56	4.096	1.265	1.170	.1	37.21	226.981	2.470	1.827
1.65	2.7225	4.492	1.285	1.182	.2	38.44	238.328	2.490	1.837
1.7	2.89	4.913	1.304	1.193	.3	39.69	250.047	2.510	1.847
1.75	3.0625	5.359	1.323	1.205	.4	40.96	262.144	2.530	1.857
1.8	3.24	5.832	1.342	1.216	.5	42.25	274.625	2.550	1.866
1.85	3.4225	6.332	1.360	1.228	.6	43.56	287.496	2.569	1.876
1.9	3.61	6.859	1.378	1.239	.7	44.89	300.763	2.588	1.885
1.95	3.8025	7.415	1.396	1.249	.8	46.24	314.432	2.608	1.895
2.	4.	8.	1.4142	1.2599	.9	47.61	328.509	2.627	1.904
.1	4.41	9.261	1.449	1.281	7.	49.	343.	2.6458	1.9129
.2	4.84	10.648	1.483	1.301	.1	50.41	357.911	2.665	1.922
.3	5.29	12.167	1.517	1.320	.2	51.84	373.248	2.683	1.931
.4	5.76	13.824	1.549	1.339	.3	53.29	389.017	2.702	1.940
.5	6.25	15.625	1.581	1.357	.4	54.76	405.224	2.720	1.949
.6	6.76	17.576	1.612	1.375	.5	56.25	421.875	2.739	1.957
.7	7.29	19.683	1.643	1.392	.6	57.76	438.976	2.757	1.966
.8	7.84	21.952	1.673	1.409	.7	59.29	456.533	2.775	1.975
.9	8.41	24.389	1.703	1.426	.8	60.84	474.552	2.793	1.983
3.	9.	27.	1.7321	1.4422	.9	62.41	493.039	2.811	1.992

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
8.	64.	512.	2.8284	2.	45	2025	91125	6.7082	3.5569
.1	65.61	531.441	2.846	2.008	46	2116	97336	6.7823	3.5830
.2	67.24	551.368	2.864	2.017	47	2209	103823	6.8557	3.6088
.3	68.89	571.787	2.881	2.025	48	2304	110592	6.9282	3.6342
.4	70.56	592.704	2.898	2.033	49	2401	117649	7.	3.6593
.5	72.25	614.125	2.915	2.041	50	2500	125000	7.0711	3.6840
.6	73.96	636.056	2.933	2.049	51	2601	132651	7.1414	3.7084
.7	75.69	658.503	2.950	2.057	52	2704	140608	7.2111	3.7325
.8	77.44	681.472	2.966	2.065	53	2809	148877	7.2801	3.7563
.9	79.21	704.969	2.983	2.072	54	2916	157464	7.3485	3.7798
9.	81.	729.	3.	2.0801	55	3025	166375	7.4162	3.8030
.1	82.81	753.571	3.017	2.088	56	3136	175616	7.4833	3.8259
.2	84.64	778.688	3.033	2.095	57	3249	185193	7.5498	3.8485
.3	86.49	804.357	3.050	2.103	58	3364	195112	7.6158	3.8709
.4	88.36	830.584	3.066	2.110	59	3481	205379	7.6811	3.8930
.5	90.25	857.375	3.082	2.118	60	3600	216000	7.7460	3.9149
.6	92.16	884.736	3.098	2.125	61	3721	226981	7.8102	3.9365
.7	94.09	912.673	3.114	2.133	62	3844	238328	7.8740	3.9579
.8	96.04	941.192	3.130	2.140	63	3969	250047	7.9373	3.9791
.9	98.01	970.299	3.146	2.147	64	4096	262144	8.	4.
10	100	1000	3.1623	2.1544	65	4225	274625	8.0623	4.0207
11	121	1331	3.3166	2.2240	66	4356	287496	8.1240	4.0412
12	144	1728	3.4641	2.2894	67	4489	300763	8.1854	4.0615
13	169	2197	3.6056	2.3513	68	4624	314432	8.2462	4.0817
14	196	2744	3.7417	2.4101	69	4761	328509	8.3066	4.1016
15	225	3375	3.8730	2.4662	70	4900	343000	8.3666	4.1213
16	256	4096	4.	2.5198	71	5041	357911	8.4261	4.1408
17	289	4913	4.1231	2.5713	72	5184	373248	8.4853	4.1602
18	324	5832	4.2426	2.6207	73	5329	389017	8.5440	4.1793
19	361	6859	4.3589	2.6684	74	5476	405224	8.6023	4.1983
20	400	8000	4.4721	2.7144	75	5625	421875	8.6603	4.2172
21	441	9261	4.5826	2.7589	76	5776	439876	8.7178	4.2358
22	484	10648	4.6904	2.8020	77	5929	456533	8.7750	4.2543
23	529	12167	4.7958	2.8439	78	6084	474552	8.8318	4.2727
24	576	13824	4.8990	2.8845	79	6241	493039	8.8882	4.2908
25	625	15625	5.	2.9240	80	6400	512000	8.9443	4.3089
26	676	17576	5.0990	2.9625	81	6561	531441	9.	4.3267
27	729	19683	5.1962	3.	82	6724	551368	9.0554	4.3445
28	784	21952	5.2915	3.0366	83	6889	571787	9.1104	4.3621
29	841	24389	5.3852	3.0723	84	7056	592704	9.1652	4.3795
30	900	27000	5.4772	3.1072	85	7225	614125	9.2195	4.3968
31	961	29791	5.5678	3.1414	86	7396	636056	9.2736	4.4140
32	1024	32768	5.6569	3.1748	87	7569	658503	9.3276	4.4310
33	1089	35937	5.7446	3.2075	88	7744	681472	9.3808	4.4480
34	1156	39304	5.8310	3.2396	89	7921	704969	9.4340	4.4647
35	1225	42875	5.9161	3.2711	90	8100	729000	9.4868	4.4814
36	1296	46656	6.	3.3019	91	8281	753571	9.5394	4.4979
37	1369	50653	6.0828	3.3322	92	8464	778688	9.5917	4.5144
38	1444	54872	6.1644	3.3620	93	8649	804357	9.6437	4.5307
39	1521	59319	6.2450	3.3912	94	8836	830584	9.6954	4.5468
40	1600	64000	6.3246	3.4200	95	9025	857375	9.7468	4.5629
41	1681	68921	6.4031	3.4482	96	9216	884736	9.7980	4.5789
42	1764	74088	6.4807	3.4760	97	9409	912673	9.8489	4.5947
43	1849	79507	6.5574	3.5034	98	9604	941192	9.8995	4.6104
44	1936	85184	6.6332	3.5303	99	9801	970299	9.9499	4.6261

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
100	10000	1000000	10.	4.6416	155	24025	3723875	12.4499	5.3717
101	10201	1030301	10.0499	4.6570	156	24336	3796416	12.4900	5.3832
102	10404	1061208	10.0995	4.6723	157	24649	3869893	12.5300	5.3947
103	10609	1092727	10.1489	4.6875	158	24964	3944312	12.5698	5.4061
104	10816	1124864	10.1980	4.7027	159	25281	4019679	12.6095	5.4175
105	11025	1157625	10.2470	4.7177	160	25600	4096000	12.6491	5.4288
106	11236	1191016	10.2956	4.7326	161	25921	4173281	12.6886	5.4401
107	11449	1225043	10.3441	4.7475	162	26244	4251528	12.7279	5.4514
108	11664	1259712	10.3923	4.7622	163	26569	4330747	12.7671	5.4626
109	11881	1295029	10.4403	4.7769	164	26896	4410944	12.8062	5.4737
110	12100	1331000	10.4881	4.7914	165	27225	4491225	12.8452	5.4848
111	12321	1367631	10.5357	4.8059	166	27556	4574296	12.8841	5.4959
112	12544	1404928	10.5830	4.8203	167	27889	4657463	12.9228	5.5069
113	12769	1442897	10.6301	4.8346	168	28224	4741632	12.9615	5.5178
114	12996	1481544	10.6771	4.8488	169	28561	4826809	13.0000	5.5288
115	13225	1520875	10.7238	4.8629	170	28900	4913000	13.0384	5.5397
116	13456	1560896	10.7703	4.8770	171	29241	5000211	13.0767	5.5505
117	13689	1601613	10.8167	4.8910	172	29584	5088448	13.1149	5.5613
118	13924	1643032	10.8628	4.9049	173	29929	5177717	13.1529	5.5721
119	14161	1685159	10.9087	4.9187	174	30276	5268024	13.1909	5.5828
120	14400	1728000	10.9545	4.9324	175	30625	5359375	13.2288	5.5934
121	14641	1771561	11.0000	4.9461	176	30976	5451776	13.2665	5.6041
122	14884	1815848	11.0454	4.9597	177	31329	5545233	13.3041	5.6147
123	15129	1860867	11.0905	4.9732	178	31684	5639752	13.3417	5.6252
124	15376	1906624	11.1355	4.9866	179	32041	5735339	13.3791	5.6357
125	15625	1953125	11.1803	5.0000	180	32400	5832000	13.4164	5.6462
126	15876	2000376	11.2250	5.0133	181	32761	5929741	13.4536	5.6567
127	16129	2048383	11.2694	5.0265	182	33124	6028568	13.4907	5.6671
128	16384	2097152	11.3137	5.0397	183	33489	6128487	13.5277	5.6774
129	16641	2146689	11.3578	5.0528	184	33856	6229504	13.5647	5.6877
130	16900	2197000	11.4018	5.0658	185	34225	6331625	13.6015	5.6980
131	17161	2248091	11.4455	5.0788	186	34596	6434856	13.6382	5.7083
132	17424	2299968	11.4891	5.0916	187	34969	6539203	13.6748	5.7185
133	17689	2352637	11.5326	5.1045	188	35344	6644672	13.7113	5.7287
134	17956	2406104	11.5758	5.1172	189	35721	6751269	13.7477	5.7388
135	18225	2460375	11.6190	5.1299	190	36100	6859000	13.7840	5.7489
136	18496	2515456	11.6619	5.1426	191	36481	6967871	13.8203	5.7590
137	18769	2571353	11.7047	5.1551	192	36864	7077888	13.8564	5.7690
138	19044	2628072	11.7473	5.1676	193	37249	7189057	13.8924	5.7790
139	19321	2685619	11.7898	5.1801	194	37636	7301384	13.9284	5.7890
140	19600	2744000	11.8322	5.1925	195	38025	7414875	13.9642	5.7989
141	19881	2803221	11.8743	5.2048	196	38416	7529536	14.0000	5.8088
142	20164	2863288	11.9164	5.2171	197	38809	7645373	14.0357	5.8186
143	20449	2924207	11.9583	5.2293	198	39204	7762392	14.0712	5.8285
144	20736	2985984	12.0000	5.2415	199	39601	7880599	14.1067	5.8383
145	21025	3048625	12.0416	5.2536	200	40000	8000000	14.1421	5.8480
146	21316	3112136	12.0830	5.2656	201	40401	8120601	14.1774	5.8578
147	21609	3176525	12.1244	5.2776	202	40804	8242408	14.2127	5.8675
148	21904	3241792	12.1655	5.2896	203	41209	8365427	14.2478	5.8771
149	22201	3307949	12.2066	5.3015	204	41616	8489664	14.2829	5.8868
150	22500	3375000	12.2474	5.3133	205	42025	8615125	14.3178	5.8964
151	22801	3442951	12.2882	5.3251	206	42436	8741816	14.3527	5.9059
152	23104	3511808	12.3288	5.3368	207	42849	8869743	14.3875	5.9155
153	23409	3581577	12.3693	5.3485	208	43264	8998912	14.4222	5.9250
154	23716	3652264	12.4097	5.3601	209	43681	9129329	14.4568	5.9345

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
210	44100	9261000	14.4914	5.9439	265	70225	18609625	16.2788	6.4232
211	44521	9393931	14.5258	5.9533	266	70756	18821096	16.3095	6.4312
212	44944	9528128	14.5602	5.9627	267	71289	19034163	16.3401	6.4393
213	45369	9663597	14.5945	5.9721	268	71824	19248832	16.3707	6.4473
214	45796	9800344	14.6287	5.9814	269	72361	19465109	16.4012	6.4553
215	46225	9938375	14.6629	5.9907	270	72900	19683000	16.4317	6.4633
216	46656	10077696	14.6969	6.0000	271	73441	19902511	16.4621	6.4713
217	47089	10218319	14.7309	6.0092	272	73984	20123648	16.4924	6.4792
218	47524	10360232	14.7648	6.0185	273	74529	20346417	16.5227	6.4872
219	47961	10503459	14.7986	6.0277	274	75076	20570824	16.5529	6.4951
220	48400	10648000	14.8324	6.0368	275	75625	20796875	16.5831	6.5030
221	48841	10793861	14.8661	6.0459	276	76176	21024576	16.6132	6.5108
222	49284	10941048	14.8997	6.0550	277	76729	21253933	16.6433	6.5187
223	49729	11089567	14.9332	6.0641	278	77284	21484952	16.6733	6.5265
224	50176	11239424	14.9666	6.0732	279	77841	21717639	16.7033	6.5343
225	50625	11390625	15.0000	6.0822	280	78400	21952000	16.7332	6.5421
226	51076	11543176	15.0333	6.0912	281	78961	22188041	16.7631	6.5499
227	51529	11697083	15.0665	6.1002	282	79524	22425768	16.7929	6.5577
228	51984	11852352	15.0997	6.1091	283	80089	22665187	16.8226	6.5654
229	52441	12008989	15.1327	6.1180	284	80656	22906304	16.8523	6.5731
230	52900	12167000	15.1658	6.1269	285	81225	23149125	16.8819	6.5808
231	53361	12326391	15.1987	6.1358	286	81796	23393656	16.9115	6.5885
232	53824	12487168	15.2315	6.1446	287	82369	23639903	16.9411	6.5962
233	54289	12649337	15.2643	6.1534	288	82944	23887872	16.9706	6.6039
234	54756	12812904	15.2971	6.1622	289	83521	24137569	17.0000	6.6115
235	55225	12977875	15.3297	6.1710	290	84100	24389000	17.0294	6.6191
236	55696	13144256	15.3623	6.1797	291	84681	24642171	17.0587	6.6267
237	56169	13312053	15.3948	6.1885	292	85264	24897088	17.0880	6.6343
238	56644	13481272	15.4272	6.1972	293	85849	25153757	17.1172	6.6419
239	57121	13651919	15.4596	6.2058	294	86436	25412184	17.1464	6.6494
240	57600	13824000	15.4919	6.2145	295	87025	25673375	17.1756	6.6569
241	58081	13997521	15.5242	6.2231	296	87616	25934336	17.2047	6.6644
242	58564	14172488	15.5563	6.2317	297	88209	26198073	17.2337	6.6719
243	59049	14348907	15.5885	6.2403	298	88804	26463592	17.2627	6.6794
244	59536	14526784	15.6205	6.2488	299	89401	26730899	17.2916	6.6869
245	60025	14706125	15.6525	6.2573	300	90000	27000000	17.3205	6.6943
246	60516	14886936	15.6844	6.2658	301	90601	27270901	17.3494	6.7018
247	61009	15069223	15.7162	6.2743	302	91204	27543608	17.3781	6.7092
248	61504	15252992	15.7480	6.2828	303	91809	27818127	17.4069	6.7166
249	62001	15438249	15.7797	6.2912	304	92416	28094464	17.4356	6.7240
250	62500	15625000	15.8114	6.2996	305	93025	28372625	17.4642	6.7313
251	63001	15813251	15.8430	6.3080	306	93636	28652616	17.4929	6.7387
252	63504	16003008	15.8745	6.3164	307	94249	28934443	17.5214	6.7460
253	64009	16194277	15.9060	6.3247	308	94864	29218112	17.5499	6.7533
254	64516	16387064	15.9374	6.3330	309	95481	29503629	17.5784	6.7606
255	65025	16581375	15.9687	6.3413	310	96100	29791000	17.6068	6.7679
256	65536	16777216	16.0000	6.3496	311	96721	30080231	17.6352	6.7752
257	66049	16974593	16.0312	6.3579	312	97344	30371328	17.6635	6.7824
258	66564	17173512	16.0624	6.3661	313	97969	30664297	17.6918	6.7897
259	67081	17373979	16.0935	6.3743	314	98596	30959144	17.7200	6.7969
260	67600	17576000	16.1245	6.3825	315	99225	31255875	17.7482	6.8041
261	68121	17779581	16.1555	6.3907	316	99856	31554496	17.7764	6.8113
262	68644	17984728	16.1864	6.3988	317	100489	31855013	17.8045	6.8185
263	69169	18191447	16.2173	6.4070	318	101124	32157432	17.8326	6.8256
264	69696	18399744	16.2481	6.4151	319	101761	32461759	17.8606	6.8328

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
320	102400	32768000	17.8885	6.8399	375	140625	52734375	19.3649	7.2112
321	103041	33076161	17.9165	6.8470	376	141376	53157376	19.3907	7.2177
322	103684	33386248	17.9444	6.8541	377	142129	53582633	19.4165	7.2240
323	104329	33698267	17.9722	6.8612	378	142884	54010152	19.4422	7.2304
324	104976	34012224	18.0000	6.8683	379	143641	54439939	19.4679	7.2368
325	105625	34328125	18.0278	6.8753	380	144400	54872000	19.4936	7.2432
326	106276	34645976	18.0555	6.8824	381	145161	55306341	19.5192	7.2495
327	106929	34965783	18.0831	6.8894	382	145924	55742968	19.5448	7.2558
328	107584	35287552	18.1108	6.8964	383	146689	56181887	19.5704	7.2622
329	108241	35611289	18.1384	6.9034	384	147456	56623104	19.5959	7.2685
330	108900	35937000	18.1659	6.9104	385	148225	57066625	19.6214	7.2748
331	109561	36264691	18.1934	6.9174	386	148996	57512456	19.6469	7.2811
332	110224	36594368	18.2209	6.9244	387	149769	57960603	19.6723	7.2874
333	110889	36926037	18.2483	6.9313	388	150544	58411072	19.6977	7.2936
334	111556	37259704	18.2757	6.9382	389	151321	58863869	19.7231	7.2999
335	112225	37595375	18.3030	6.9451	390	152100	59319000	19.7484	7.3061
336	112896	37933056	18.3303	6.9521	391	152881	59776471	19.7737	7.3124
337	113569	38272753	18.3576	6.9589	392	153664	60236288	19.7990	7.3186
338	114244	38614472	18.3848	6.9658	393	154449	60698457	19.8242	7.3248
339	114921	38958219	18.4120	6.9727	394	155236	61162984	19.8494	7.3310
340	115600	39304000	18.4391	6.9795	395	156025	61629875	19.8746	7.3372
341	116281	39651821	18.4662	6.9864	396	156816	62099136	19.8997	7.3434
342	116964	40001638	18.4932	6.9932	397	157609	62570773	19.9249	7.3496
343	117649	40353607	18.5203	7.0000	398	158404	63044792	19.9499	7.3558
344	118336	40707584	18.5472	7.0068	399	159201	63521199	19.9750	7.3619
345	119025	41063625	18.5742	7.0136	400	160000	64000000	20.0000	7.3681
346	119716	41421736	18.6011	7.0203	401	160801	64481201	20.0250	7.3742
347	120409	41781923	18.6279	7.0271	402	161604	64964808	20.0499	7.3803
348	121104	42144192	18.6548	7.0338	403	162409	65450827	20.0749	7.3864
349	121801	42508549	18.6815	7.0406	404	163216	65939264	20.0998	7.3925
350	122500	42875000	18.7083	7.0473	405	164025	66430125	20.1246	7.3986
351	123201	43243551	18.7350	7.0540	406	164836	66923416	20.1494	7.4047
352	123904	43614208	18.7617	7.0607	407	165649	67419143	20.1742	7.4108
353	124609	43986977	18.7883	7.0674	408	166464	67917312	20.1990	7.4169
354	125316	44361864	18.8149	7.0740	409	167281	68417929	20.2237	7.4229
355	126025	44738875	18.8414	7.0807	410	168100	68921000	20.2485	7.4290
356	126736	45118016	18.8680	7.0873	411	168921	69426531	20.2731	7.4350
357	127449	45519923	18.8944	7.0940	412	169744	69934528	20.2978	7.4410
358	128164	45882712	18.9209	7.1006	413	170569	70444997	20.3224	7.4470
359	128881	46268279	18.9473	7.1072	414	171396	70957944	20.3470	7.4530
360	129600	46656000	18.9737	7.1138	415	172225	71473375	20.3715	7.4590
361	130321	47045881	19.0000	7.1204	416	173056	71991296	20.3961	7.4650
362	131044	47437928	19.0263	7.1269	417	173889	72511713	20.4206	7.4710
363	131769	47832147	19.0526	7.1335	418	174724	73034632	20.4450	7.4770
364	132496	48228544	19.0788	7.1400	419	175561	73560059	20.4695	7.4829
365	133225	48627125	19.1050	7.1466	420	176400	74088000	20.4939	7.4889
366	133956	49027896	19.1311	7.1531	421	177241	74618461	20.5183	7.4948
367	134689	49430863	19.1572	7.1596	422	178084	75151448	20.5426	7.5007
368	135424	49836032	19.1833	7.1661	423	178929	75686967	20.5670	7.5067
369	136161	50243409	19.2094	7.1726	424	179776	76225024	20.5913	7.5126
370	136900	50653000	19.2354	7.1791	425	180625	76765625	20.6155	7.5185
371	137641	51064811	19.2614	7.1855	426	181476	77308776	20.6398	7.5244
372	138384	51478848	19.2873	7.1920	427	182329	77854483	20.6640	7.5302
373	139129	51895117	19.3132	7.1984	428	183184	78402752	20.6882	7.5361
374	139876	52313624	19.3391	7.2048	429	184041	78953559	20.7123	7.5420

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
430	184900	79507000	20.7364	7.5478	485	235225	114084125	22.0227	7.8568
431	185761	80062991	20.7605	7.5537	486	236196	114791256	22.0454	7.8622
432	186624	80621568	20.7846	7.5595	487	237169	115501303	22.0681	7.8676
433	187489	81182737	20.8087	7.5654	488	238144	116214272	22.0907	7.8730
434	188356	81746504	20.8327	7.5712	489	239121	116930169	22.1133	7.8784
435	189225	82312875	20.8567	7.5770	490	240100	117649000	22.1359	7.8837
436	190096	82881856	20.8806	7.5828	491	241081	118370771	22.1585	7.8891
437	190969	83453453	20.9045	7.5886	492	242064	119095488	22.1811	7.8944
438	191844	84027672	20.9284	7.5944	493	243049	119823157	22.2036	7.8998
439	192721	84604519	20.9523	7.6001	494	244036	120553784	22.2261	7.9051
440	193600	85184000	20.9762	7.6059	495	245025	121287375	22.2486	7.9105
441	194481	85766121	21.0000	7.6117	496	246016	122029396	22.2711	7.9158
442	195364	86350888	21.0238	7.6174	497	247009	122783473	22.2935	7.9211
443	196249	86938307	21.0476	7.6232	498	248004	123550992	22.3159	7.9264
444	197136	87528384	21.0713	7.6289	499	249001	124325149	22.3383	7.9317
445	198025	88121125	21.0950	7.6346	500	250000	125000000	22.3607	7.9370
446	198916	88716536	21.1187	7.6403	501	251001	125751501	22.3830	7.9423
447	199809	89314633	21.1424	7.6460	502	252004	126506008	22.4054	7.9476
448	200704	89915392	21.1660	7.6517	503	253009	127263527	22.4277	7.9528
449	201601	90518849	21.1896	7.6574	504	254016	128024064	22.4499	7.9581
450	202500	91125000	21.2132	7.6631	505	255025	128787625	22.4722	7.9634
451	203401	91733851	21.2368	7.6688	506	256036	129554216	22.4944	7.9686
452	204304	92345408	21.2603	7.6744	507	257049	130323843	22.5167	7.9739
453	205209	92959677	21.2838	7.6800	508	258064	131096512	22.5389	7.9791
454	206116	93576664	21.3073	7.6857	509	259081	131872229	22.5610	7.9843
455	207025	94196275	21.3307	7.6914	510	260100	132651000	22.5832	7.9896
456	207936	94818816	21.3542	7.6970	511	261121	133432831	22.6053	7.9948
457	208849	95443993	21.3776	7.7026	512	262144	134217728	22.6274	8.0000
458	209764	96071912	21.4009	7.7082	513	263169	135005697	22.6495	8.0052
459	210681	96702579	21.4243	7.7138	514	264196	135796744	22.6716	8.0104
460	211600	97336000	21.4476	7.7194	515	265225	136590875	22.6936	8.0156
461	212521	97972181	21.4709	7.7250	516	266256	137388096	22.7156	8.0208
462	213444	98611128	21.4942	7.7306	517	267289	138188413	22.7376	8.0260
463	214369	99252847	21.5174	7.7362	518	268324	138991832	22.7596	8.0311
464	215296	99897344	21.5407	7.7418	519	269361	139798359	22.7816	8.0363
465	216225	100544625	21.5639	7.7473	520	270400	140608000	22.8035	8.0415
466	217156	101194696	21.5870	7.7529	521	271441	141420761	22.8254	8.0466
467	218089	101847563	21.6102	7.7584	522	272484	142236648	22.8473	8.0517
468	219024	102503232	21.6333	7.7639	523	273529	143055667	22.8692	8.0569
469	219961	103161709	21.6564	7.7695	524	274576	143877824	22.8910	8.0620
470	220900	103823000	21.6795	7.7750	525	275625	144703125	22.9129	8.0671
471	221841	104487111	21.7025	7.7805	526	276676	145531576	22.9347	8.0723
472	222784	105154048	21.7256	7.7860	527	277729	146363183	22.9565	8.0774
473	223729	105823817	21.7486	7.7915	528	278784	147197952	22.9783	8.0825
474	224676	106496424	21.7715	7.7970	529	279841	148035889	23.0000	8.0876
475	225625	107171875	21.7945	7.8025	530	280900	148877000	23.0217	8.0927
476	226576	107850176	21.8174	7.8079	531	281961	149721291	23.0434	8.0978
477	227529	108531333	21.8403	7.8134	532	283024	150568768	23.0651	8.1028
478	228484	109215352	21.8632	7.8188	533	284089	151419437	23.0868	8.1079
479	229441	109903239	21.8861	7.8243	534	285156	152273304	23.1084	8.1130
480	230400	110592000	21.9089	7.8297	535	286225	153130375	23.1301	8.1180
481	231361	111284641	21.9317	7.8352	536	287296	153990656	23.1517	8.1231
482	232324	111980168	21.9545	7.8406	537	288369	154854153	23.1733	8.1281
483	233289	112678587	21.9773	7.8460	538	289444	155720872	23.1948	8.1332
484	234256	113379904	22.0000	7.8514	539	290521	156590819	23.2164	8.1382

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
540	291600	157464000	23.2379	8.1433	595	354025	210644875	24.3926	8.4108
541	292681	158340421	23.2594	8.1483	596	355216	211708736	24.4131	8.4155
542	293764	159220088	23.2809	8.1533	597	356409	212776173	24.4336	8.4202
543	294849	160103007	23.3024	8.1583	598	357604	213847192	24.4540	8.4249
544	295936	160989184	23.3238	8.1633	599	358801	214921779	24.4745	8.4296
545	297025	161878625	23.3452	8.1683	600	360000	216000000	24.4949	8.4343
546	298116	162771336	23.3666	8.1733	601	361201	217081801	24.5153	8.4390
547	299209	163667323	23.3880	8.1783	602	362404	218167208	24.5357	8.4437
548	300304	164566592	23.4094	8.1833	603	363609	219256227	24.5561	8.4484
549	301401	165469149	23.4307	8.1882	604	364816	220348864	24.5764	8.4530
550	302500	166375000	23.4521	8.1932	605	366025	221445125	24.5967	8.4577
551	303601	167284151	23.4734	8.1982	606	367236	222545016	24.6171	8.4623
552	304704	168196608	23.4947	8.2031	607	368449	223648543	24.6374	8.4670
553	305809	169112377	23.5160	8.2081	608	369664	224755712	24.6577	8.4716
554	306916	170031464	23.5372	8.2130	609	370881	225866529	24.6779	8.4763
555	308025	170953875	23.5584	8.2180	610	372100	226981000	24.6982	8.4809
556	309136	171879616	23.5797	8.2229	611	373321	228099131	24.7184	8.4856
557	310249	172808693	23.6008	8.2278	612	374544	229220928	24.7386	8.4902
558	311364	173741112	23.6220	8.2327	613	375769	230346397	24.7588	8.4948
559	312481	174676879	23.6432	8.2377	614	376996	231475544	24.7790	8.4994
560	313600	175616000	23.6643	8.2426	615	378225	232608375	24.7992	8.5040
561	314721	176558481	23.6854	8.2475	616	379456	233744806	24.8193	8.5086
562	315844	177504328	23.7065	8.2524	617	380689	234885113	24.8395	8.5132
563	316969	178453547	23.7276	8.2573	618	381924	236029032	24.8596	8.5178
564	318096	179406144	23.7487	8.2621	619	383161	237176659	24.8797	8.5224
565	319225	180362125	23.7697	8.2670	620	384400	238328000	24.8998	8.5270
566	320356	181321496	23.7908	8.2719	621	385641	239483061	24.9199	8.5316
567	321489	182284263	23.8118	8.2768	622	386884	240641848	24.9399	8.5362
568	322624	183250432	23.8328	8.2816	623	388129	241804367	24.9600	8.5408
569	323761	184220009	23.8537	8.2865	624	389376	242970624	24.9800	8.5453
570	324900	185193000	23.8747	8.2913	625	390625	244140625	25.0000	8.5499
571	326041	186169411	23.8956	8.2962	626	391876	245314376	25.0200	8.5544
572	327184	187149248	23.9165	8.3010	627	393129	246491882	25.0400	8.5590
573	328329	188132517	23.9374	8.3059	628	394384	247673152	25.0599	8.5635
574	329476	189119224	23.9583	8.3107	629	395641	248858489	25.0799	8.5681
575	330625	190109375	23.9792	8.3155	630	396900	250047000	25.0998	8.5726
576	331776	191102976	24.0000	8.3203	631	398161	251239591	25.1197	8.5772
577	332929	192100033	24.0208	8.3251	632	399424	252435068	25.1396	8.5817
578	334084	193100552	24.0416	8.3300	633	400689	253636137	25.1595	8.5862
579	335241	194104539	24.0624	8.3348	634	401956	254840104	25.1794	8.5907
580	336400	195112000	24.0832	8.3396	635	403225	256047875	25.1992	8.5952
581	337561	196122941	24.1039	8.3443	636	404496	257259456	25.2190	8.5997
582	338724	197137368	24.1247	8.3491	637	405769	258474853	25.2389	8.6043
583	339889	198155287	24.1454	8.3539	638	407044	259694072	25.2587	8.6088
584	341056	199176704	24.1661	8.3587	639	408321	260917119	25.2784	8.6133
585	342225	200201625	24.1868	8.3634	640	409600	262144000	25.2982	8.6177
586	343396	201230056	24.2074	8.3682	641	410881	263374721	25.3180	8.6222
587	344569	202262003	24.2281	8.3730	642	412164	264609288	25.3377	8.6267
588	345744	203297472	24.2487	8.3777	643	413449	265847707	25.3574	8.6312
589	346921	204336469	24.2693	8.3825	644	414736	267089984	25.3772	8.6357
590	348100	205379000	24.2899	8.3872	645	416025	268336125	25.3969	8.6401
591	349281	206425071	24.3105	8.3919	646	417316	269586136	25.4165	8.6446
592	350464	207474688	24.3311	8.3967	647	418609	270840023	25.4362	8.6490
593	351649	208527857	24.3516	8.4014	648	419904	272097792	25.4558	8.6535
594	352836	209584584	24.3721	8.4061	649	421201	273359449	25.4755	8.6579

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
650	422500	274625000	25.4951	8.6624	705	497025	350402625	26.5518	8.9001
651	423801	275894451	25.5147	8.6668	706	498436	351895816	26.5707	8.9043
652	425104	277167808	25.5343	8.6713	707	499849	353393243	26.5895	8.9085
653	426409	278445077	25.5539	8.6757	708	501264	354894912	26.6083	8.9127
654	427716	279726264	25.5734	8.6801	709	502681	356400829	26.6271	8.9169
655	429025	281011375	25.5930	8.6845	710	504100	357911000	26.6458	8.9211
656	430336	282300416	25.6125	8.6890	711	505521	359425131	26.6646	8.9253
657	431649	283593393	25.6320	8.6934	712	506944	360944128	26.6833	8.9295
658	432964	284890312	25.6515	8.6978	713	508369	362467097	26.7021	8.9337
659	434281	286191179	25.6710	8.7022	714	509796	363994344	26.7208	8.9378
660	435600	287496000	25.6905	8.7066	715	511225	365525875	26.7395	8.9420
661	436921	288804781	25.7099	8.7110	716	512656	367061696	26.7582	8.9462
662	438244	290117528	25.7294	8.7154	717	514089	368601813	26.7769	8.9503
663	439569	291434247	25.7488	8.7198	718	515524	370146232	26.7955	8.9545
664	440896	292754944	25.7682	8.7241	719	516961	371694959	26.8142	8.9587
665	442225	294079625	25.7876	8.7285	720	518400	373248000	26.8328	8.9628
666	443556	295408296	25.8070	8.7329	721	519841	374805361	26.8514	8.9670
667	444889	296740969	25.8263	8.7373	722	521284	376367048	26.8701	8.9711
668	446224	298077632	25.8457	8.7416	723	522729	377933067	26.8887	8.9752
669	447561	299418309	25.8650	8.7460	724	524176	379503424	26.9072	8.9794
670	448900	300763000	25.8844	8.7503	725	525625	381078125	26.9258	8.9835
671	450241	302111711	25.9037	8.7547	726	527076	382657176	26.9444	8.9876
672	451584	303464448	25.9230	8.7590	727	528529	384240583	26.9629	8.9918
673	452929	304821217	25.9422	8.7634	728	529984	385828352	26.9815	8.9959
674	454276	306182024	25.9615	8.7677	729	531441	387420459	27.0000	9.0000
675	455625	307546875	25.9808	8.7721	730	532900	389017000	27.0185	9.0041
676	456976	308915776	26.0000	8.7764	731	534361	390617991	27.0370	9.0082
677	458329	310288733	26.0192	8.7807	732	535824	392223168	27.0555	9.0123
678	459684	311665752	26.0384	8.7850	733	537289	393833537	27.0740	9.0164
679	461041	313046839	26.0576	8.7893	734	538756	395446904	27.0924	9.0205
680	462400	314432000	26.0768	8.7937	735	540225	397065375	27.1109	9.0246
681	463761	315821241	26.0960	8.7980	736	541696	398688856	27.1293	9.0287
682	465124	317214568	26.1151	8.8023	737	543169	400315553	27.1477	9.0328
683	466489	318611987	26.1343	8.8066	738	544644	401947372	27.1662	9.0369
684	467856	320013504	26.1534	8.8109	739	546121	403583419	27.1846	9.0410
685	469225	321419125	26.1725	8.8152	740	547600	405224000	27.2029	9.0450
686	470596	322828856	26.1916	8.8194	741	549081	406869021	27.2213	9.0491
687	471969	324242703	26.2107	8.8237	742	550564	408518488	27.2397	9.0532
688	473344	325660672	26.2298	8.8280	743	552049	410172407	27.2580	9.0572
689	474721	327082769	26.2488	8.8323	744	553536	411830784	27.2764	9.0613
690	476100	328509000	26.2679	8.8366	745	555025	413493625	27.2947	9.0654
691	477481	329939371	26.2869	8.8408	746	556516	415160936	27.3130	9.0694
692	478864	331373888	26.3059	8.8451	747	558009	416832723	27.3313	9.0735
693	480249	332812557	26.3249	8.8493	748	559504	418508992	27.3496	9.0775
694	481636	334255384	26.3439	8.8536	749	561001	420189749	27.3679	9.0816
695	483025	335702375	26.3629	8.8578	750	562500	421875000	27.3861	9.0856
696	484416	337153536	26.3818	8.8621	751	564001	423564751	27.4044	9.0896
697	485809	338608873	26.4008	8.8663	752	565504	425259008	27.4226	9.0937
698	487204	340068392	26.4197	8.8706	753	567009	426957777	27.4408	9.0977
699	488601	341532099	26.4386	8.8748	754	568516	428661064	27.4591	9.1017
700	490000	343000000	26.4575	8.8790	755	570025	430368875	27.4773	9.1057
701	491401	344472101	26.4764	8.8833	756	571536	432081216	27.4955	9.1098
702	492804	345948408	26.4953	8.8875	757	573049	433798093	27.5136	9.1138
703	494209	347428927	26.5141	8.8917	758	574564	435519512	27.5318	9.1178
704	495616	348913664	26.5330	8.8959	759	576081	437245479	27.5500	9.1218

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
760	577600	438976000	27.5681	9.1258	815	664225	541343375	28.5482	9.3408
761	579121	440711081	27.5862	9.1298	816	665856	543338496	28.5657	9.3447
762	580644	442450728	27.6043	9.1338	817	667489	545338513	28.5832	9.3485
763	582169	444194947	27.6225	9.1378	818	669124	547343432	28.6007	9.3523
764	583696	445943744	27.6405	9.1418	819	670761	549353259	28.6182	9.3561
765	585225	447697125	27.6586	9.1458	820	672400	551368000	28.6356	9.3599
766	586756	449455096	27.6767	9.1498	821	674041	553387661	28.6531	9.3637
767	588289	451217663	27.6948	9.1537	822	675684	555412248	28.6705	9.3675
768	589824	452984832	27.7128	9.1577	823	677329	557441767	28.6880	9.3713
769	591361	454756609	27.7308	9.1617	824	678976	559476224	28.7054	9.3751
770	592900	456533000	27.7489	9.1657	825	680625	561515625	28.7228	9.3789
771	594441	458314011	27.7669	9.1696	826	682276	563559976	28.7402	9.3827
772	595984	460099648	27.7849	9.1736	827	683929	565609289	28.7576	9.3865
773	597529	461889917	27.8029	9.1775	828	685584	567663552	28.7750	9.3902
774	599076	463684824	27.8209	9.1815	829	687241	569722789	28.7924	9.3940
775	600625	465484375	27.8388	9.1855	830	688900	571787000	28.8097	9.3978
776	602176	467288576	27.8568	9.1894	831	690561	573856191	28.8271	9.4016
777	603729	469097433	27.8747	9.1933	832	692224	575930368	28.8444	9.4053
778	605284	470910952	27.8927	9.1973	833	693889	578009537	28.8617	9.4091
779	606841	472729139	27.9106	9.2012	834	695556	580093704	28.8791	9.4129
780	608400	474552000	27.9285	9.2052	835	697225	582182875	28.8964	9.4166
781	609961	476379541	27.9464	9.2091	836	698896	584277056	28.9137	9.4204
782	611524	478211768	27.9643	9.2130	837	700569	586376253	28.9310	9.4241
783	613089	480048637	27.9821	9.2170	838	702244	588480472	28.9482	9.4279
784	614656	481890304	28.0000	9.2209	839	703921	590589719	28.9655	9.4316
785	616225	483736625	28.0179	9.2248	840	705600	592704000	28.9828	9.4354
786	617796	485587656	28.0357	9.2287	841	707281	594823321	29.0000	9.4391
787	619369	487443403	28.0535	9.2326	842	708964	596947688	29.0172	9.4429
788	620944	489303872	28.0713	9.2365	843	710649	599077107	29.0345	9.4466
789	622521	491169069	28.0891	9.2404	844	712336	601211584	29.0517	9.4503
790	624100	493039000	28.1069	9.2443	845	714025	603351125	29.0689	9.4541
791	625681	494913671	28.1247	9.2482	846	715716	605495736	29.0861	9.4578
792	627264	496793088	28.1425	9.2521	847	717409	607645423	29.1033	9.4615
793	628849	498677257	28.1603	9.2560	848	719104	609800192	29.1204	9.4652
794	630436	500566184	28.1780	9.2599	849	720801	611960049	29.1376	9.4690
795	632025	502459875	28.1957	9.2638	850	722500	614125000	29.1548	9.4727
796	633616	504358336	28.2135	9.2677	851	724201	616295051	29.1719	9.4764
797	635209	506261573	28.2312	9.2716	852	725904	618470208	29.1890	9.4801
798	636804	508169592	28.2489	9.2754	853	727609	620650477	29.2062	9.4838
799	638401	510082399	28.2666	9.2793	854	729316	622835864	29.2233	9.4875
800	640000	512000000	28.2843	9.2832	855	731025	625026375	29.2404	9.4912
801	641601	513922401	28.3019	9.2870	856	732736	627222016	29.2575	9.4949
802	643204	515849608	28.3196	9.2909	857	734449	629422793	29.2746	9.4986
803	644809	517781627	28.3373	9.2948	858	736164	631628712	29.2916	9.5023
804	646416	519718464	28.3549	9.2986	859	737881	633839779	29.3087	9.5060
805	648025	521660125	28.3725	9.3025	860	739600	636056000	29.3258	9.5097
806	649636	523606616	28.3901	9.3063	861	741321	638277381	29.3428	9.5134
807	651249	525557943	28.4077	9.3102	862	743044	640503928	29.3598	9.5171
808	652864	527514112	28.4253	9.3140	863	744769	642735647	29.3769	9.5207
809	654481	529475129	28.4429	9.3179	864	746496	644972544	29.3939	9.5244
810	656100	531441000	28.4605	9.3217	865	748225	647214625	29.4109	9.5281
811	657721	533411731	28.4781	9.3255	866	749956	649461896	29.4279	9.5317
812	659344	535387328	28.4956	9.3294	867	751689	651714363	29.4449	9.5354
813	660969	537367797	28.5132	9.3332	868	753424	653972032	29.4618	9.5391
814	662596	539353144	28.5307	9.3370	869	755161	656234909	29.4788	9.5427

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
870	756900	658503000	29.4958	9.5464	925	855625	791453125	30.4138	9.7435
871	758641	660776311	29.5127	9.5501	926	857476	794023776	30.4302	9.7470
872	760384	663054848	29.5296	9.5537	927	859329	796597983	30.4467	9.7505
873	762129	665338617	29.5466	9.5574	928	861184	799178752	30.4631	9.7540
874	763876	667627624	29.5635	9.5610	929	863041	801765089	30.4795	9.7575
875	765625	669921875	29.5804	9.5647	930	864900	804357000	30.4959	9.7610
876	767376	672221376	29.5973	9.5683	931	866761	806954491	30.5123	9.7645
877	769129	674526133	29.6142	9.5719	932	868624	809557668	30.5287	9.7680
878	770884	676836152	29.6311	9.5756	933	870489	812166237	30.5450	9.7715
879	772641	679151439	29.6479	9.5792	934	872356	814780504	30.5614	9.7750
880	774400	681472000	29.6648	9.5828	935	874225	817400375	30.5778	9.7785
881	776161	683797841	29.6816	9.5865	936	876096	820025856	30.5941	9.7819
882	777924	686128968	29.6985	9.5901	937	877969	822556953	30.6105	9.7854
883	779689	688465387	29.7153	9.5937	938	879844	825293672	30.6268	9.7889
884	781456	690807104	29.7321	9.5973	939	881721	827936019	30.6431	9.7924
885	783225	693154125	29.7489	9.6010	940	883600	830584000	30.6594	9.7959
886	784996	695506456	29.7658	9.6046	941	885481	833237621	30.6757	9.7995
887	786769	697864109	29.7825	9.6082	942	887364	835896888	30.6920	9.8028
888	788544	700227072	29.7993	9.6118	943	889249	838561807	30.7083	9.8063
889	790321	702595369	29.8161	9.6154	944	891136	841232384	30.7246	9.8097
890	792100	704969000	29.8329	9.6190	945	893025	843908625	30.7409	9.8132
891	793881	707347971	29.8496	9.6226	946	894916	846590536	30.7571	9.8167
892	795664	709732288	29.8664	9.6262	947	896809	849278123	30.7734	9.8201
893	797449	712121957	29.8831	9.6298	948	898704	851971392	30.7896	9.8236
894	799236	714516984	29.8998	9.6334	949	900601	854670349	30.8058	9.8270
895	801025	716917375	29.9166	9.6370	950	902500	857375000	30.8221	9.8305
896	802816	719323136	29.9333	9.6406	951	904401	860085351	30.8383	9.8339
897	804609	721734273	29.9500	9.6442	952	906304	862801408	30.8545	9.8374
898	806404	724150792	29.9666	9.6477	953	908209	865523177	30.8707	9.8408
899	808201	726572699	29.9833	9.6513	954	910116	868250664	30.8869	9.8443
900	810000	729000000	30.0000	9.6549	955	912025	870983875	30.9031	9.8477
901	811801	731432701	30.0167	9.6585	956	913936	873722816	30.9192	9.8511
902	813604	733870808	30.0333	9.6620	957	915849	876467493	30.9354	9.8546
903	815409	736314327	30.0500	9.6656	958	917764	879217912	30.9516	9.8580
904	817216	738763264	30.0666	9.6692	959	919681	881974079	30.9677	9.8614
905	819025	741217625	30.0832	9.6727	960	921600	884736000	30.9839	9.8648
906	820836	743677416	30.0998	9.6763	961	923521	887503681	31.0000	9.8683
907	822649	746142643	30.1164	9.6799	962	925444	890277128	31.0161	9.8717
908	824464	748613312	30.1330	9.6834	963	927369	893056347	31.0322	9.8751
909	826281	751089429	30.1496	9.6870	964	929296	895841344	31.0483	9.8785
910	828100	753571000	30.1662	9.6905	965	931225	898633125	31.0644	9.8819
911	829921	756058031	30.1828	9.6941	966	933156	901428696	31.0805	9.8854
912	831744	758550528	30.1993	9.6976	967	935089	904231063	31.0966	9.8888
913	833569	761048497	30.2159	9.7012	968	937024	907039232	31.1127	9.8922
914	835396	763551944	30.2324	9.7047	969	938961	909853209	31.1288	9.8956
915	837225	766060875	30.2490	9.7082	970	940900	912673000	31.1448	9.8990
916	839056	768575296	30.2655	9.7118	971	942841	915498611	31.1609	9.9024
917	840889	771095213	30.2820	9.7153	972	944784	918330048	31.1769	9.9058
918	842721	773620632	30.2985	9.7188	973	946729	921167317	31.1929	9.9092
919	844561	776151559	30.3150	9.7224	974	948676	924010424	31.2090	9.9126
920	846400	778688000	30.3315	9.7259	975	950625	926859375	31.2250	9.9160
921	848241	781229961	30.3480	9.7294	976	952576	929714176	31.2410	9.9194
922	850084	783777448	30.3645	9.7329	977	954529	932574833	31.2570	9.9227
923	851929	786330167	30.3809	9.7364	978	956484	935441352	31.2730	9.9261
924	853776	788889024	30.3974	9.7400	979	958441	938313739	31.2890	9.9295

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube. Root.	No.	Square.	Cube.	Sq. Root.	Cube. Root.
980	960400	941192000	31.3050	9.9829	1035	1071225	1108717875	32.1714	10.1158
981	962361	944076141	31.3209	9.9863	1036	1073296	1111934656	32.1870	10.1186
982	964324	946966168	31.3369	9.9896	1037	1075369	1115157653	32.2025	10.1218
983	966289	949862087	31.3528	9.9430	1038	1077444	1118386872	32.2180	10.1251
984	968256	952763904	31.3688	9.9464	1039	1079521	1121622319	32.2335	10.1283
985	970225	955671625	31.3847	9.9497	1040	1081600	1124864000	32.2490	10.1316
986	972196	958585256	31.4006	9.9531	1041	1083681	1128111921	32.2645	10.1348
987	974169	961504803	31.4166	9.9565	1042	1085764	1131366088	32.2800	10.1381
988	976144	964430272	31.4325	9.9598	1043	1087849	1134626507	32.2955	10.1413
989	978121	967361669	31.4484	9.9632	1044	1089936	1137893184	32.3110	10.1446
990	980100	970299000	31.4643	9.9666	1045	1092025	1141166125	32.3265	10.1478
991	982081	973242271	31.4802	9.9699	1046	1094116	1144445336	32.3419	10.1510
992	984064	976191458	31.4960	9.9733	1047	1096209	1147730823	32.3574	10.1543
993	986049	979146657	31.5119	9.9766	1048	1098304	1151022592	32.3728	10.1575
994	988036	982107784	31.5278	9.9800	1049	1100401	1154320649	32.3883	10.1607
995	990025	985074875	31.5436	9.9833	1050	1102500	1157625000	32.4037	10.1640
996	992016	988047936	31.5595	9.9866	1051	1104601	1160935651	32.4191	10.1672
997	994009	991026973	31.5753	9.9900	1052	1106704	1164252608	32.4345	10.1704
998	996004	994011992	31.5911	9.9933	1053	1108809	1167575877	32.4500	10.1736
999	998001	997002999	31.6070	9.9967	1054	1110916	1170905464	32.4654	10.1769
1000	1000000	1000000000	31.6228	10.0000	1055	1113025	1174241375	32.4808	10.1801
1001	1002001	1003003001	31.6386	10.0033	1056	1115136	1177585216	32.4962	10.1833
1002	1004004	1006012008	31.6544	10.0067	1057	1117249	1180932193	32.5115	10.1865
1003	1006009	1009027027	31.6702	10.0100	1058	1119364	1184287112	32.5269	10.1897
1004	1008016	1012048064	31.6860	10.0133	1059	1121481	1187648379	32.5423	10.1929
1005	1010025	1015075125	31.7017	10.0166	1060	1123600	1191016000	32.5576	10.1961
1006	1012036	1018108216	31.7175	10.0200	1061	1125721	1194389981	32.5730	10.1993
1007	1014049	1021147343	31.7333	10.0233	1062	1127844	1197770322	32.5883	10.2025
1008	1016064	1024192512	31.7490	10.0266	1063	1129969	1201157047	32.6036	10.2057
1009	1018081	1027243729	31.7648	10.0299	1064	1132096	1204550144	32.6190	10.2089
1010	1020100	1030301000	31.7805	10.0332	1065	1134225	1207949625	32.6343	10.2121
1011	1022121	1033644331	31.7962	10.0365	1066	1136356	1211355496	32.6497	10.2153
1012	1024144	1036433738	31.8119	10.0398	1067	1138489	1214767763	32.6650	10.2185
1013	1026169	1039509197	31.8277	10.0431	1068	1140624	1218186432	32.6803	10.2217
1014	1028196	1042590744	31.8434	10.0465	1069	1142761	1221611509	32.6956	10.2249
1015	1030225	1045678375	31.8591	10.0498	1070	1144900	1225043000	32.7109	10.2281
1016	1032256	1048772096	31.8748	10.0531	1071	1147041	1228480911	32.7261	10.2313
1017	1034289	1051871913	31.8904	10.0563	1072	1149184	1231925248	32.7414	10.2345
1018	1036324	1054977832	31.9061	10.0596	1073	1151329	1235376017	32.7567	10.2376
1019	1038361	1058089859	31.9218	10.0629	1074	1153476	1238833224	32.7719	10.2408
1020	1040400	1061208000	31.9374	10.0662	1075	1155625	1242296875	32.7872	10.2440
1021	1042441	1064332261	31.9531	10.0695	1076	1157776	1245766976	32.8024	10.2472
1022	1044484	1067462648	31.9687	10.0728	1077	1159929	1249243333	32.8177	10.2503
1023	1046529	1070599167	31.9844	10.0761	1078	1162084	1252726552	32.8329	10.2535
1024	1048576	1073741824	32.0000	10.0794	1079	1164241	1256216039	32.8481	10.2567
1025	1050625	1076890625	32.0156	10.0826	1080	1166400	1259712000	32.8634	10.2599
1026	1052676	1080045576	32.0312	10.0859	1081	1168561	1263214441	32.8786	10.2630
1027	1054729	1083206683	32.0468	10.0892	1082	1170724	1266723668	32.8938	10.2662
1028	1056784	1086373952	32.0624	10.0925	1083	1172889	1270238787	32.9090	10.2693
1029	1058841	1089547369	32.0780	10.0957	1084	1175056	1273760704	32.9242	10.2725
1030	1060900	1092727000	32.0936	10.0990	1085	1177225	1277289125	32.9393	10.2757
1031	1062961	1095912791	32.1092	10.1023	1086	1179396	1280824056	32.9545	10.2788
1032	1065024	1099104768	32.1248	10.1055	1087	1181569	1284365503	32.9697	10.2820
1033	1067089	1102302937	32.1403	10.1088	1088	1183744	1287913472	32.9848	10.2851
1034	1069156	1105507304	32.1559	10.1121	1089	1185921	1291467969	33.0000	10.2883

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
1090	1188100	1295029000	33.0151	10.2914	1145	1311025	1501123625	33.8378	10.4617
1091	1190281	1298596571	33.0303	10.2946	1146	1313316	1505060136	33.8526	10.4647
1092	1192464	1302170688	33.0454	10.2977	1147	1315609	1509003523	33.8674	10.4678
1093	1194649	1305751357	33.0606	10.3009	1148	1317904	1512953792	33.8821	10.4708
1094	1196836	1309385854	33.0757	10.3040	1149	1320201	1516910949	33.8969	10.4739
1095	1199025	1312932375	33.0908	10.3071	1150	1322500	1520875000	33.9116	10.4769
1096	1201216	1316532736	33.1059	10.3103	1151	1324801	1524845951	33.9264	10.4799
1097	1203409	1320136673	33.1210	10.3134	1152	1327104	1528823808	33.9411	10.4830
1098	1205604	1323753192	33.1361	10.3165	1153	1329409	1532808577	33.9559	10.4860
1099	1207801	1327373299	33.1512	10.3197	1154	1331716	1536800264	33.9706	10.4890
1100	1210000	1331000000	33.1662	10.3228	1155	1334025	1540798875	33.9853	10.4921
1101	1212201	1334633301	33.1813	10.3259	1156	1336336	1544804416	34.0000	10.4951
1102	1214404	1338273208	33.1964	10.3290	1157	1338649	1548816893	34.0147	10.4981
1103	1216609	1341919727	33.2114	10.3322	1158	1340964	1552836812	34.0294	10.5011
1104	1218816	1345572864	33.2264	10.3353	1159	1343281	1556862679	34.0441	10.5042
1105	1221025	1349232625	33.2415	10.3384	1160	1345600	1560896000	34.0588	10.5072
1106	1223236	1352899016	33.2566	10.3415	1161	1347921	1564936281	34.0735	10.5102
1107	1225449	1356572043	33.2716	10.3447	1162	1350244	1568983528	34.0881	10.5132
1108	1227664	1360251712	33.2866	10.3478	1163	1352569	1573037747	34.1028	10.5162
1109	1229881	1363938029	33.3017	10.3509	1164	1354896	1577098944	34.1174	10.5192
1110	1232100	1367631000	33.3167	10.3540	1165	1357225	1581167125	34.1321	10.5223
1111	1234321	1371330631	33.3317	10.3571	1166	1359556	1585242396	34.1467	10.5253
1112	1236544	1375036928	33.3467	10.3602	1167	1361889	1589324463	34.1614	10.5283
1113	1238769	1378749897	33.3617	10.3633	1168	1364224	1593413632	34.1760	10.5313
1114	1240996	1382469544	33.3766	10.3664	1169	1366561	1597509809	34.1906	10.5343
1115	1243225	1386195875	33.3916	10.3695	1170	1368900	1601613000	34.2053	10.5373
1116	1245456	1389928896	33.4066	10.3726	1171	1371241	1605723211	34.2199	10.5403
1117	1247689	1393686613	33.4215	10.3757	1172	1373584	1609840448	34.2345	10.5433
1118	1249924	1397415032	33.4365	10.3788	1173	1375929	1613964717	34.2491	10.5463
1119	1252161	1401168159	33.4515	10.3819	1174	1378276	1618096024	34.2637	10.5493
1120	1254400	1404928000	33.4664	10.3850	1175	1380625	1622234375	34.2783	10.5523
1121	1256641	1408694561	33.4813	10.3881	1176	1382976	1626379776	34.2929	10.5553
1122	1258884	1412467848	33.4963	10.3912	1177	1385329	1630532233	34.3074	10.5583
1123	1261129	1416247867	33.5112	10.3943	1178	1387684	1634691752	34.3220	10.5612
1124	1263376	1420034624	33.5261	10.3973	1179	1390041	1638858339	34.3366	10.5642
1125	1265625	1423828125	33.5410	10.4004	1180	1392400	1643032000	34.3511	10.5672
1126	1267876	1427628876	33.5559	10.4035	1181	1394761	1647212741	34.3657	10.5702
1127	1270129	1431435383	33.5708	10.4066	1182	1397124	1651400568	34.3802	10.5732
1128	1272384	1435249152	33.5857	10.4097	1183	1399489	1655595487	34.3948	10.5762
1129	1274641	1439069689	33.6006	10.4127	1184	1401856	1659797504	34.4093	10.5791
1130	1276900	1442897000	33.6155	10.4158	1185	1404225	1664000625	34.4238	10.5821
1131	1279161	1446731091	33.6303	10.4189	1186	1406596	166822856	34.4384	10.5851
1132	1281424	1450571968	33.6452	10.4219	1187	1408969	1672446203	34.4529	10.5881
1133	1283689	1454419637	33.6601	10.4250	1188	1411344	1676676672	34.4674	10.5910
1134	1285956	1458274104	33.6749	10.4281	1189	1413721	1680914209	34.4819	10.5940
1135	1288225	1462135375	33.6898	10.4311	1190	1416100	1685159000	34.4964	10.5970
1136	1290496	1466003456	33.7046	10.4342	1191	1418481	1689410871	34.5109	10.6000
1137	1292769	1469878353	33.7194	10.4373	1192	1420864	1693669888	34.5254	10.6029
1138	1295044	1473760072	33.7342	10.4404	1193	1423249	1697936057	34.5398	10.6059
1139	1297321	1477648619	33.7491	10.4434	1194	1425636	1702209384	34.5543	10.6088
1140	1299600	1481544000	33.7639	10.4464	1195	1428025	1706489875	34.5688	10.6118
1141	1301881	1485446221	33.7787	10.4495	1196	1430416	1710777536	34.5832	10.6148
1142	1304164	1489355288	33.7935	10.4525	1197	1432809	1715072373	34.5977	10.6177
1143	1306449	1493271207	33.8083	10.4556	1198	1435204	1719374392	34.6121	10.6207
1144	1308736	1497193984	33.8231	10.4586	1199	1437601	1723683599	34.6266	10.6236

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
1200	1440000	1728000000	34.6410	10.6266	1255	1575025	1976656375	35.4260	10.7865
1201	1442401	1732323601	34.6554	10.6295	1256	1577536	1981385216	35.4401	10.7894
1202	1444804	1736654408	34.6699	10.6325	1257	1580049	1986121593	35.4542	10.7922
1203	1447209	1740992427	34.6843	10.6354	1258	1582564	1990865512	35.4683	10.7951
1204	1449616	1745337664	34.6987	10.6384	1259	1585081	1995616979	35.4824	10.7980
1205	1452025	1749690125	34.7131	10.6413	1260	1587600	2000376000	35.4965	10.8008
1206	1454436	1754049816	34.7275	10.6443	1261	1590121	2005142581	35.5106	10.8037
1207	1456849	1758416743	34.7419	10.6472	1262	1592644	2009916728	35.5246	10.8065
1208	1459264	1762790912	34.7563	10.6501	1263	1595169	2014698447	35.5387	10.8094
1209	1461681	1767172329	34.7707	10.6530	1264	1597696	2019487744	35.5528	10.8122
1210	1464100	1771561000	34.7851	10.6560	1265	1600225	2024284625	35.5668	10.8151
1211	1466521	1775956931	34.7994	10.6590	1266	1602756	2029089096	35.5809	10.8179
1212	1468944	1780360128	34.8138	10.6619	1267	1605289	2033901169	35.5949	10.8208
1213	1471369	1784770597	34.8281	10.6648	1268	1607824	2038720832	35.6090	10.8236
1214	1473796	1789188344	34.8425	10.6678	1269	1610361	2043548109	35.6230	10.8265
1215	1476225	1793613375	34.8569	10.6707	1270	1612900	2048383000	35.6371	10.8293
1216	1478656	1798045696	34.8712	10.6736	1271	1615441	2053225511	35.6511	10.8322
1217	1481089	1802485313	34.8855	10.6765	1272	1617984	2058075648	35.6651	10.8350
1218	1483524	1806932232	34.8999	10.6795	1273	1620529	2062933417	35.6791	10.8378
1219	1485961	1811386459	34.9142	10.6824	1274	1623076	2067798824	35.6931	10.8407
1220	1488400	1815848000	34.9285	10.6853	1275	1625625	2072671875	35.7071	10.8435
1221	1490841	1820316861	34.9428	10.6882	1276	1628176	2077552576	35.7211	10.8463
1222	1493284	1824793048	34.9571	10.6911	1277	1630729	2082440933	35.7351	10.8492
1223	1495729	1829276567	34.9714	10.6940	1278	1633284	2087336952	35.7491	10.8520
1224	1498176	1833767424	34.9857	10.6970	1279	1635841	2092240639	35.7631	10.8548
1225	1500625	1838265625	35.0000	10.6999	1280	1638400	2097152000	35.7771	10.8577
1226	1503076	1842771176	35.0143	10.7028	1281	1640961	2102071041	35.7911	10.8605
1227	1505529	1847284083	35.0286	10.7057	1282	1643524	2106997768	35.8050	10.8633
1228	1507984	1851804352	35.0428	10.7086	1283	1646089	2111932187	35.8190	10.8661
1229	1510441	1856331989	35.0571	10.7115	1284	1648656	2116874304	35.8329	10.8690
1230	1512900	1860867000	35.0714	10.7144	1285	1651225	2121824125	35.8469	10.8718
1231	1515361	1865409391	35.0856	10.7173	1286	1653796	2126781656	35.8608	10.8746
1232	1517824	1869959168	35.0999	10.7202	1287	1656369	2131746903	35.8748	10.8774
1233	1520289	1874516337	35.1141	10.7231	1288	1658944	2136719872	35.8887	10.8802
1234	1522756	1879080904	35.1283	10.7260	1289	1661521	2141700569	35.9026	10.8831
1235	1525225	1883652875	35.1426	10.7289	1290	1664100	2146689000	35.9166	10.8859
1236	1527696	1888292256	35.1568	10.7318	1291	1666681	2151685171	35.9305	10.8887
1237	1530169	18928819053	35.1710	10.7347	1292	1669264	2156688908	35.9444	10.8915
1238	1532644	1897413272	35.1852	10.7376	1293	1671849	2161700757	35.9583	10.8943
1239	1535121	1902014919	35.1994	10.7405	1294	1674436	2166720184	35.9722	10.8971
1240	1537600	1906624000	35.2136	10.7484	1295	1677025	2171747375	35.9861	10.8999
1241	1540081	1911240521	35.2278	10.7463	1296	1679616	2176782396	36.0000	10.9027
1242	1542564	1915864488	35.2420	10.7491	1297	1682209	2181825073	36.0139	10.9055
1243	1545049	1920495907	35.2562	10.7520	1298	1684804	2186875592	36.0278	10.9083
1244	1547536	1925134784	35.2704	10.7549	1299	1687401	2191933889	36.0416	10.9111
1245	1550025	1929781125	35.2846	10.7578	1300	1690000	2197000000	36.0555	10.9139
1246	1552516	1934434936	35.2987	10.7607	1301	1692601	2202073901	36.0694	10.9167
1247	1555009	1939096223	35.3129	10.7635	1302	1695204	2207155608	36.0832	10.9195
1248	1557504	1943764992	35.3270	10.7664	1303	1697809	2212245127	36.0971	10.9223
1249	1560001	1948441249	35.3412	10.7693	1304	1700416	2217342464	36.1109	10.9251
1250	1562500	1953125000	35.3553	10.7722	1305	1703025	2222447625	36.1248	10.9279
1251	1565001	1957816251	35.3695	10.7750	1306	1705636	2227560616	36.1386	10.9307
1252	1567504	1962515008	35.3835	10.7779	1307	1708249	2232681443	36.1525	10.9335
1253	1570009	1967221277	35.3977	10.7808	1308	1710864	2237810112	36.1663	10.9363
1254	1572516	1971935064	35.4119	10.7837	1309	1713481	2242946629	36.1801	10.9391

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
1310	1716100	2248091000	36.1939	10.9418	1365	1863225	2543302125	36.9459	11.0929
1311	1718721	2253243231	36.2077	10.9446	1366	1865956	2548958906	36.9594	11.0956
1312	1721344	2258403328	36.2215	10.9474	1367	1868689	2554497863	36.9730	11.0983
1313	1723969	2263571297	36.2353	10.9502	1368	1871424	2560108032	36.9865	11.1010
1314	1726596	2268747144	36.2491	10.9530	1369	1874161	2565726489	37.0000	11.1037
1315	1729225	2273930875	36.2629	10.9557	1370	1876900	2571353000	37.0135	11.1064
1316	1731856	2279122496	36.2767	10.9585	1371	1879641	2576987811	37.0270	11.1091
1317	1734489	2284322013	36.2905	10.9613	1372	1882384	2582630818	37.0405	11.1118
1318	1737124	2289529432	36.3043	10.9640	1373	1885129	2588282117	37.0540	11.1145
1319	1739761	2294744755	36.3180	10.9668	1374	1887876	2593941624	37.0675	11.1172
1320	1742400	2299968000	36.3318	10.9696	1375	1890625	2599609375	37.0810	11.1199
1321	1745041	2305199161	36.3456	10.9724	1376	1893376	2605285376	37.0945	11.1226
1322	1747684	2310438248	36.3593	10.9752	1377	1896129	2610969633	37.1080	11.1253
1323	1750329	2315685267	36.3731	10.9779	1378	1898884	2616662152	37.1214	11.1280
1324	1752976	2320940224	36.3868	10.9807	1379	1901641	2622362939	37.1349	11.1307
1325	1755625	2326203125	36.4005	10.9834	1380	1904400	2628072000	37.1484	11.1334
1326	1758276	2331473976	36.4143	10.9862	1381	1907161	2633789341	37.1618	11.1361
1327	1760929	2336752783	36.4280	10.9890	1382	1909924	2639514968	37.1753	11.1387
1328	1763584	2342039552	36.4417	10.9917	1383	1912689	2645248887	37.1887	11.1414
1329	1766241	2347334289	36.4555	10.9945	1384	1915456	2650991104	37.2021	11.1441
1330	1768900	2352637000	36.4692	10.9972	1385	1918225	2656741625	37.2156	11.1468
1331	1771561	2357947691	36.4829	11.0000	1386	1920996	2662500456	37.2290	11.1495
1332	1774224	2363266368	36.4966	11.0028	1387	1923769	2668267603	37.2424	11.1522
1333	1776889	2368593037	36.5103	11.0055	1388	1926544	2674043072	37.2559	11.1548
1334	1779556	2373927704	36.5240	11.0083	1389	1929321	2679820869	37.2693	11.1575
1335	1782225	2379270375	36.5377	11.0110	1390	1932100	2685612000	37.2827	11.1602
1336	1784896	2384621056	36.5513	11.0138	1391	1934881	2691419471	37.2961	11.1629
1337	1787569	2389979753	36.5650	11.0165	1392	1937664	2697228288	37.3095	11.1655
1338	1790244	2395344672	36.5787	11.0193	1393	1940449	2703045457	37.3229	11.1682
1339	1792921	2400721219	36.5923	11.0220	1394	1943236	2708870984	37.3363	11.1709
1340	1795600	2406104000	36.6060	11.0247	1395	1946025	2714704875	37.3497	11.1736
1341	1798281	2411494821	36.6197	11.0275	1396	1948816	2720547136	37.3631	11.1762
1342	1800964	2416893688	36.6333	11.0302	1397	1951609	2726397773	37.3765	11.1789
1343	1803649	2422300607	36.6469	11.0330	1398	1954404	2732256792	37.3898	11.1816
1344	1806336	2427715584	36.6606	11.0357	1399	1957201	2738124199	37.4032	11.1842
1345	1809025	2433138625	36.6742	11.0384	1400	1960000	2744000000	37.4166	11.1869
1346	1811716	2438569736	36.6879	11.0412	1401	1962801	2749884201	37.4299	11.1896
1347	1814409	2444008923	36.7015	11.0439	1402	1965604	2755776808	37.4433	11.1924
1348	1817104	2449451692	36.7151	11.0466	1403	1968409	2761677827	37.4566	11.1949
1349	1819801	2454911549	36.7287	11.0494	1404	1971216	2767587264	37.4700	11.1975
1350	1822500	2460375000	36.7423	11.0521	1405	1974025	2773505125	37.4833	11.2002
1351	1825201	2465846551	36.7560	11.0548	1406	1976836	2779431416	37.4967	11.2028
1352	1827904	2471326208	36.7696	11.0575	1407	1979649	2785366143	37.5100	11.2055
1353	1830609	2476813977	36.7831	11.0603	1408	1982464	2791309312	37.5233	11.2082
1354	1833316	2482309864	36.7967	11.0630	1409	1985281	2797260029	37.5366	11.2108
1355	1836025	2487813875	36.8103	11.0657	1410	1988100	2803221000	37.5500	11.2135
1356	1838736	2493326016	36.8239	11.0684	1411	1990921	2809195931	37.5633	11.2161
1357	1841449	2498846293	36.8375	11.0712	1412	1993744	2815166528	37.5766	11.2188
1358	1844164	2504374712	36.8511	11.0739	1413	1996569	2821151997	37.5899	11.2214
1359	1846881	2509911279	36.8646	11.0766	1414	1999396	2827145944	37.6032	11.2240
1360	1849600	2515456000	36.8782	11.0793	1415	2002225	2833148375	37.6165	11.2267
1361	1852321	2521008581	36.8917	11.0820	1416	2005056	2839159296	37.6298	11.2293
1362	1855044	2526569928	36.9053	11.0847	1417	2007889	2845178713	37.6431	11.2320
1363	1857769	2532139147	36.9188	11.0875	1418	2010724	2851206632	37.6563	11.2346
1364	1860496	2537716544	36.9324	11.0902	1419	2013561	2857243059	37.6696	11.2373

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
1420	2016400	2863288000	37.6829	11.2399	1475	2175625	3209046875	38.4057	11.3632
1421	2019241	2869341461	37.6962	11.2425	1476	2178576	3215578176	38.4187	11.3658
1422	2022084	2875403448	37.7094	11.2452	1477	2181529	3222118333	38.4318	11.3683
1423	2024929	2881473967	37.7227	11.2478	1478	2184484	3228667352	38.4448	11.3709
1424	2027776	2887553024	37.7359	11.2505	1479	2187441	3235225239	38.4578	11.3735
1425	2030625	2893640625	37.7492	11.2531	1480	2190400	3241792000	38.4708	11.3760
1426	2033476	2899736776	37.7624	11.2557	1481	2193361	3248367641	38.4838	11.3786
1427	2036329	2905841483	37.7757	11.2583	1482	2196324	3254952168	38.4968	11.4012
1428	2039184	2911954752	37.7889	11.2610	1483	2199289	3261545587	38.5097	11.4037
1429	2042041	2918076589	37.8021	11.2636	1484	2202256	3268147904	38.5227	11.4063
1430	2044900	2924207000	37.8153	11.2662	1485	2205225	3274759125	38.5357	11.4089
1431	2047761	2930345991	37.8286	11.2689	1486	2208196	3281379256	38.5487	11.4114
1432	2050624	2936493568	37.8418	11.2715	1487	2211169	3288008303	38.5616	11.4140
1433	2053489	2942649737	37.8550	11.2741	1488	2214144	3294646272	38.5746	11.4165
1434	2056356	2948814504	37.8682	11.2767	1489	2217121	3301293169	38.5876	11.4191
1435	2059225	2954987875	37.8814	11.2793	1490	2220100	3307949000	38.6005	11.4216
1436	2062096	2961169856	37.8946	11.2820	1491	2223081	3314613771	38.6135	11.4242
1437	2064969	2967360453	37.9078	11.2846	1492	2226064	3321287488	38.6264	11.4268
1438	2067844	2973559672	37.9210	11.2872	1493	2229049	3327970157	38.6394	11.4293
1439	2070721	2979767519	37.9342	11.2898	1494	2232036	3334661784	38.6523	11.4319
1440	2073600	2985984000	37.9473	11.2924	1495	2235025	3341362375	38.6652	11.4344
1441	2076481	2992209121	37.9605	11.2950	1496	2238016	3348071936	38.6782	11.4370
1442	2079364	2998442888	37.9737	11.2977	1497	2241009	3354790473	38.6911	11.4395
1443	2082249	3004685307	37.9868	11.3003	1498	2244004	3361517992	38.7040	11.4421
1444	2085136	3010933684	38.0000	11.3029	1499	2247001	3368254499	38.7169	11.4446
1445	2088025	3017196125	38.0132	11.3055	1500	2250000	3375000000	38.7298	11.4471
1446	2090916	3023464536	38.0263	11.3081	1501	2253001	3381754501	38.7427	11.4497
1447	2093809	3029741623	38.0395	11.3107	1502	2256004	3388518008	38.7556	11.4522
1448	2096704	3036027392	38.0526	11.3133	1503	2259009	3395290527	38.7685	11.4548
1449	2099601	3042321849	38.0657	11.3159	1504	2262016	3402072064	38.7814	11.4573
1450	2102500	3048625000	38.0789	11.3185	1505	2265025	3408862625	38.7943	11.4598
1451	2105401	3054933681	38.0920	11.3211	1506	2268036	3415662216	38.8072	11.4624
1452	2108304	3061257408	38.1051	11.3237	1507	2271049	3422470843	38.8201	11.4649
1453	2111209	3067586677	38.1182	11.3263	1508	2274064	3429288512	38.8330	11.4675
1454	2114116	3073924664	38.1314	11.3289	1509	2277081	3436115329	38.8458	11.4700
1455	2117025	3080271375	38.1445	11.3315	1510	2280100	3442951000	38.8587	11.4725
1456	2119936	3086636816	38.1576	11.3341	1511	2283121	3449795531	38.8716	11.4751
1457	2122849	3092990993	38.1707	11.3367	1512	2286144	3456649728	38.8844	11.4776
1458	2125764	3099363912	38.1838	11.3393	1513	2289169	3463512607	38.8973	11.4801
1459	2128681	3105745579	38.1969	11.3419	1514	2292196	3470384744	38.9102	11.4826
1460	2131600	3112136000	38.2099	11.3445	1515	2295225	3477265875	38.9230	11.4852
1461	2134521	3118535181	38.2230	11.3471	1516	2298256	3484156096	38.9358	11.4877
1462	2137444	3124943128	38.2361	11.3496	1517	2301289	3491055413	38.9487	11.4902
1463	2140369	3131359847	38.2492	11.3522	1518	2304324	3497963832	38.9615	11.4927
1464	2143296	3137785344	38.2623	11.3548	1519	2307361	3504881359	38.9744	11.4953
1465	2146225	3144219625	38.2753	11.3574	1520	2310400	3511808000	38.9872	11.4978
1466	2149156	3150662696	38.2884	11.3600	1521	2313441	3518743761	39.0000	11.5003
1467	2152089	3157114563	38.3014	11.3626	1522	2316484	3525688648	39.0128	11.5028
1468	2155024	3163575232	38.3145	11.3652	1523	2319529	3532642667	39.0256	11.5054
1469	2157961	3170044709	38.3275	11.3677	1524	2322576	3539605824	39.0384	11.5079
1470	2160900	3176529000	38.3406	11.3703	1525	2325625	3546578125	39.0512	11.5104
1471	2163841	3183010111	38.3536	11.3729	1526	2328676	3553559576	39.0640	11.5129
1472	2166784	3189506048	38.3667	11.3755	1527	2331729	3560550183	39.0768	11.5154
1473	2169729	3196010817	38.3797	11.3780	1528	2334784	3567549952	39.0896	11.5179
1474	2172676	3202524424	38.3927	11.3806	1529	2337841	3574558889	39.1024	11.5204

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

No.	Square.	Cube.	Sq. Root.	Cube Root.	No.	Square.	Cube.	Sq. Root.	Cube Root.
1530	2340900	3581577000	39.1152	11.5230	1565	2449225	3833037125	39.5601	11.6102
1531	2343961	3588604291	39.1280	11.5255	1566	2452356	3840389496	39.5727	11.6126
1532	2347024	3595640768	39.1408	11.5280	1567	2455489	3847751263	39.5854	11.6151
1533	2350089	3602686437	39.1535	11.5305	1568	2458624	3855123432	39.5980	11.6176
1534	2353156	3609741304	39.1663	11.5330	1569	2461761	3862503009	39.6106	11.6200
1535	2356225	3616805375	39.1791	11.5355	1570	2464900	3869893000	39.6232	11.6225
1536	2359296	3623878656	39.1918	11.5380	1571	2468041	3877292411	39.6358	11.6250
1537	2362369	3630961153	39.2046	11.5405	1572	2471184	3884701248	39.6485	11.6274
1538	2365444	3638052872	39.2173	11.5430	1573	2474329	3892119517	39.6611	11.6299
1539	2368521	3645153819	39.2301	11.5455	1574	2477476	3899547224	39.6737	11.6324
1540	2371600	3652264000	39.2428	11.5480	1575	2480625	3906984375	39.6863	11.6348
1541	2374681	3659383421	39.2556	11.5505	1576	2483776	3914430976	39.6989	11.6373
1542	2377764	3666512088	39.2683	11.5530	1577	2486929	3921887033	39.7115	11.6398
1543	2380849	3673650007	39.2810	11.5555	1578	2490084	3929352552	39.7240	11.6422
1544	2383936	3680797184	39.2938	11.5580	1579	2493241	3936827539	39.7366	11.6447
1545	2387025	3687953625	39.3065	11.5605	1580	2496400	3944312000	39.7492	11.6471
1546	2390116	3695119336	39.3192	11.5630	1581	2499561	3951805941	39.7618	11.6496
1547	2393209	3702294323	39.3319	11.5655	1582	2502724	3959309368	39.7744	11.6520
1548	2396304	3709478592	39.3446	11.5680	1583	2505889	3966822287	39.7869	11.6545
1549	2399401	3716672149	39.3573	11.5705	1584	2509056	3974344704	39.7995	11.6570
1550	2402500	3723875000	39.3700	11.5729	1585	2512225	3981876625	39.8121	11.6594
1551	2405601	3731087151	39.3827	11.5754	1586	2515396	3989418056	39.8246	11.6619
1552	2408704	3738308608	39.3954	11.5779	1587	2518569	3996969003	39.8372	11.6643
1553	2411809	3745539377	39.4081	11.5804	1588	2521744	4004529472	39.8497	11.6668
1554	2414916	3752779464	39.4208	11.5829	1589	2524921	4012099469	39.8623	11.6692
1555	2418025	3760028875	39.4335	11.5854	1590	2528100	4019679000	39.8748	11.6717
1556	2421136	3767287616	39.4462	11.5879	1591	2531281	4027268071	39.8873	11.6741
1557	2424249	3774555693	39.4588	11.5903	1592	2534464	4034866688	39.8999	11.6765
1558	2427364	3781833112	39.4715	11.5928	1593	2537649	4042474857	39.9124	11.6790
1559	2430481	3789119879	39.4842	11.5953	1594	2540836	4050092584	39.9249	11.6814
1560	2433600	3796416000	39.4968	11.5978	1595	2544025	4057719875	39.9375	11.7839
1561	2436721	3803721481	39.5095	11.6003	1596	2547216	4065356736	39.9500	11.6863
1562	2439844	3811036328	39.5221	11.6027	1597	2550409	4073003173	39.9625	11.6888
1563	2442969	3818360547	39.5348	11.6052	1598	2553604	4080659192	39.9750	11.6912
1564	2446096	3825691144	39.5474	11.6077	1599	2556801	4088324799	39.9875	11.6936
					1600	2560000	4096000000	40.0000	11.6961

NATURAL TRIGONOMETRICAL FUNCTIONS.

°	M.	Sine.	Co-Vers.	Cosec.	Tang.	Cotan.	Secant.	Ver. Sin.	Cosine.		
0	0	.00000	1.0000	Infinite	.00000	Infinite	1.0000	.00000	1.0000	90	0
	15	.00436	.99564	229.18	.00436	229.18	1.0000	.00001	.99999		45
	30	.00873	.99127	114.59	.00873	114.59	1.0000	.00004	.99996		30
	45	.01309	.98691	76.397	.01309	76.390	1.0001	.00009	.99991		15
1	0	.01745	.98255	57.299	.01745	57.290	1.0001	.00015	.99985	89	0
	15	.02181	.97819	45.840	.02182	45.829	1.0002	.00024	.99976		45
	30	.02618	.97382	38.202	.02618	38.188	1.0003	.00034	.99966		30
	45	.03054	.96946	32.746	.03055	32.730	1.0005	.00047	.99953		15
2	0	.03490	.96510	28.654	.03492	28.636	1.0006	.00061	.99939	88	0
	15	.03926	.96074	25.471	.03929	25.452	1.0008	.00077	.99923		45
	30	.04362	.95633	22.926	.04366	22.904	1.0009	.00095	.99905		30
	45	.04798	.95202	20.843	.04803	20.819	1.0011	.00115	.99885		15
3	0	.05234	.94766	19.107	.05241	19.081	1.0014	.00137	.99863	87	0
	15	.05669	.94331	17.639	.05678	17.611	1.0016	.00161	.99839		45
	30	.06105	.93895	16.380	.06116	16.350	1.0019	.00187	.99813		30
	45	.06540	.93460	15.290	.06551	15.257	1.0021	.00214	.99786		15
4	0	.06976	.93024	14.336	.06993	14.301	1.0024	.00244	.99756	86	0
	15	.07411	.92589	13.494	.07431	13.457	1.0028	.00275	.99725		45
	30	.07846	.92154	12.745	.07870	12.706	1.0031	.00308	.99692		30
	45	.08281	.91719	12.076	.08309	12.035	1.0034	.00343	.99656		15
5	0	.08716	.91284	11.474	.08749	11.430	1.0038	.00381	.99619	85	0
	15	.09150	.90850	10.929	.09189	10.883	1.0042	.00420	.99580		45
	30	.09585	.90415	10.433	.09629	10.385	1.0046	.00460	.99540		30
	45	.10019	.89981	9.9812	.10069	9.9310	1.0051	.00503	.99497		15
6	0	.10453	.89547	9.5668	.10510	9.5144	1.0055	.00548	.99452	84	0
	15	.10887	.89113	9.1855	.10952	9.1809	1.0060	.00594	.99406		45
	30	.11320	.88680	8.8337	.11393	8.7769	1.0065	.00643	.99357		30
	45	.11754	.88246	8.5079	.11836	8.4490	1.0070	.00693	.99307		15
7	0	.12187	.87813	8.2055	.12278	8.1443	1.0075	.00745	.99255	83	0
	15	.12620	.87380	7.9240	.12722	7.8606	1.0081	.00800	.99200		45
	30	.13053	.86947	7.6613	.13165	7.5958	1.0086	.00856	.99144		30
	45	.13485	.86515	7.4156	.13609	7.3479	1.0092	.00913	.99086		15
8	0	.13917	.86083	7.1853	.14054	7.1154	1.0098	.00973	.99027	82	0
	15	.14349	.85651	6.9690	.14499	6.8969	1.0105	.01035	.98965		45
	30	.14781	.85219	6.7653	.14945	6.6912	1.0111	.01098	.98902		30
	45	.15212	.84788	6.5736	.15391	6.4971	1.0118	.01164	.98836		15
9	0	.15643	.84357	6.3924	.15838	6.3138	1.0125	.01231	.98769	81	0
	15	.16074	.83926	6.2211	.16286	6.1402	1.0132	.01300	.98700		45
	30	.16505	.83495	6.0589	.16734	5.9758	1.0139	.01371	.98629		30
	45	.16935	.83065	5.9049	.17183	5.8197	1.0147	.01444	.98556		15
10	0	.17365	.82635	5.7588	.17633	5.6713	1.0154	.01519	.98481	80	0
	15	.17794	.82206	5.6198	.18083	5.5301	1.0162	.01596	.98404		45
	30	.18224	.81776	5.4874	.18534	5.3955	1.0170	.01675	.98325		30
	45	.18652	.81348	5.3612	.18986	5.2672	1.0179	.01755	.98245		15
11	0	.19081	.80919	5.2408	.19438	5.1440	1.0187	.01837	.98163	79	0
	15	.19509	.80491	5.1258	.19891	5.0273	1.0196	.01921	.98079		45
	30	.19937	.80063	5.0158	.20345	4.9152	1.0205	.02008	.97992		30
	45	.20364	.79636	4.9106	.20800	4.8077	1.0214	.02095	.97905		15
12	0	.20791	.79209	4.8097	.21256	4.7046	1.0223	.02185	.97815	78	0
	15	.21218	.78782	4.7130	.21712	4.6057	1.0233	.02277	.97723		45
	30	.21644	.78356	4.6202	.22169	4.5107	1.0243	.02370	.97630		30
	45	.22070	.77930	4.5311	.22628	4.4194	1.0253	.02466	.97534		15
13	0	.22495	.77505	4.4454	.23087	4.3315	1.0263	.02563	.97437	77	0
	15	.22920	.77080	4.3630	.23547	4.2468	1.0273	.02662	.97338		45
	30	.23345	.76655	4.2837	.24008	4.1653	1.0284	.02763	.97237		30
	45	.23769	.76231	4.2072	.24470	4.0867	1.0295	.02866	.97134		15
14	0	.24192	.75808	4.1336	.24933	4.0108	1.0306	.02970	.97030	76	0
	15	.24615	.75385	4.0625	.25397	3.9375	1.0317	.03077	.96923		45
	30	.25038	.74962	3.9939	.25862	3.8667	1.0329	.03185	.96815		30
	45	.25460	.74540	3.9277	.26328	3.7983	1.0341	.03295	.96705		15
15	0	.25882	.74118	3.8637	.26795	3.7320	1.0353	.03407	.96593	75	0
		Cosine.	Ver. Sin.	Secant.	Cotan.	Tang.	Cosec.	Co-Vers.	Sine.	°	M.

From 75° to 90° read from bottom of table upwards.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

•	M.	Sine.	Co-Vers.	Cosec.	Tang.	Cotan.	Secant.	Ver. Sin.	Cosine.		
15	0	.25882	.74118	3.8637	.26795	3.7320	1.0353	.03407	.96593	75	0
	15	.26303	.73697	3.8018	.27263	3.6680	1.0365	.03521	.96479		45
	30	.26724	.73276	3.7420	.27732	3.6059	1.0377	.03637	.96363		30
	45	.27144	.72856	3.6840	.28203	3.5457	1.0390	.03754	.96246		15
16	0	.27564	.72436	3.6280	.28674	3.4874	1.0403	.03874	.96126	74	0
	15	.27983	.72017	3.5736	.29147	3.4308	1.0416	.03995	.96005		45
	30	.28402	.71598	3.5209	.29621	3.3759	1.0429	.04118	.95882		30
	45	.28820	.71180	3.4699	.30096	3.3226	1.0443	.04243	.95757		15
17	0	.29237	.70763	3.4203	.30573	3.2709	1.0457	.04370	.95630	73	0
	15	.29654	.70346	3.3722	.31051	3.2205	1.0471	.04498	.95502		45
	30	.30070	.69929	3.3255	.31530	3.1716	1.0485	.04628	.95372		30
	45	.30486	.69514	3.2801	.32010	3.1240	1.0500	.04760	.95240		15
18	0	.30902	.69098	3.2361	.32492	3.0777	1.0515	.04894	.95106	72	0
	15	.31316	.68684	3.1932	.32975	3.0326	1.0530	.05030	.94970		45
	30	.31730	.68270	3.1515	.33459	2.9887	1.0545	.05168	.94832		30
	45	.32144	.67856	3.1110	.33945	2.9459	1.0560	.05307	.94693		15
19	0	.32557	.67443	3.0715	.34433	2.9042	1.0576	.05448	.94552	71	0
	15	.32969	.67031	3.0331	.34921	2.8636	1.0592	.05591	.94409		45
	30	.33381	.66619	2.9957	.35412	2.8239	1.0608	.05736	.94264		30
	45	.33792	.66208	2.9593	.35904	2.7852	1.0625	.05882	.94118		15
20	0	.34202	.65798	2.9238	.36397	2.7475	1.0642	.06031	.93969	70	0
	15	.34612	.65388	2.8892	.36892	2.7106	1.0659	.06181	.93819		45
	30	.35021	.64979	2.8554	.37388	2.6746	1.0676	.06333	.93667		30
	45	.35429	.64571	2.8225	.37887	2.6395	1.0694	.06486	.93514		15
21	0	.35837	.64163	2.7904	.38386	2.6051	1.0711	.06642	.93358	69	0
	15	.36244	.63756	2.7591	.38888	2.5715	1.0729	.06799	.93201		45
	30	.36650	.63350	2.7285	.39391	2.5386	1.0748	.06958	.93042		30
	45	.37056	.62944	2.6986	.39896	2.5065	1.0766	.07119	.92881		15
22	0	.37461	.62539	2.6695	.40403	2.4751	1.0785	.07282	.92718	68	0
	15	.37865	.62135	2.6410	.40911	2.4443	1.0804	.07446	.92554		45
	30	.38268	.61732	2.6131	.41421	2.4142	1.0824	.07612	.92388		30
	45	.38671	.61329	2.5859	.41933	2.3847	1.0844	.07780	.92220		15
23	0	.39073	.60927	2.5593	.42447	2.3559	1.0864	.07950	.92050	67	0
	15	.39474	.60526	2.5333	.42963	2.3276	1.0884	.08121	.91879		45
	30	.39875	.60125	2.5078	.43481	2.2998	1.0904	.08294	.91706		30
	45	.40275	.59725	2.4829	.44001	2.2727	1.0925	.08469	.91531		15
24	0	.40674	.59326	2.4586	.44523	2.2460	1.0946	.08645	.91355	66	0
	15	.41072	.58928	2.4348	.45047	2.2199	1.0968	.08824	.91176		45
	30	.41469	.58531	2.4114	.45573	2.1943	1.0989	.09004	.90996		30
	45	.41866	.58134	2.3886	.46101	2.1692	1.1011	.09186	.90814		15
25	0	.42262	.57738	2.3662	.46631	2.1445	1.1034	.09369	.90631	65	0
	15	.42657	.57343	2.3443	.47163	2.1203	1.1056	.09554	.90446		45
	30	.43051	.56949	2.3228	.47697	2.0965	1.1079	.09741	.90259		30
	45	.43445	.56555	2.3018	.48234	2.0732	1.1102	.09930	.90070		15
26	0	.43837	.56163	2.2812	.48773	2.0503	1.1126	.10121	.89879	64	0
	15	.44229	.55771	2.2610	.49314	2.0278	1.1150	.10313	.89687		45
	30	.44620	.55380	2.2412	.49858	2.0057	1.1174	.10507	.89493		30
	45	.45010	.54990	2.2217	.50404	1.9840	1.1198	.10702	.89298		15
27	0	.45399	.54601	2.2027	.50952	1.9626	1.1223	.10899	.89101	63	0
	15	.45787	.54213	2.1840	.51503	1.9415	1.1248	.11098	.88902		45
	30	.46175	.53825	2.1657	.52057	1.9210	1.1274	.11299	.88701		30
	45	.46561	.53439	2.1477	.52612	1.9007	1.1300	.11501	.88499		15
28	0	.46947	.53053	2.1300	.53171	1.8807	1.1326	.11705	.88295	62	0
	15	.47332	.52668	2.1127	.53732	1.8611	1.1352	.11911	.88089		45
	30	.47716	.52284	2.0957	.54295	1.8418	1.1379	.12118	.87882		30
	45	.48099	.51901	2.0790	.54862	1.8228	1.1406	.12327	.87673		15
29	0	.48481	.51519	2.0627	.55431	1.8040	1.1433	.12538	.87462	61	0
	15	.48862	.51138	2.0466	.56003	1.7856	1.1461	.12750	.87250		45
	30	.49242	.50758	2.0308	.56577	1.7675	1.1490	.12964	.87036		30
	45	.49622	.50378	2.0152	.57155	1.7496	1.1518	.13180	.86820		15
30	0	.50000	.50000	2.0000	.57735	1.7320	1.1547	.13397	.86602	60	0
		Cosine.	Ver. Sin.	Secant.	Cotan.	Tang.	Cosec.	Co-Vers.	Sine.	°	M.

From 60° to 75° read from bottom of table upwards.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

°	M.	Sine.	Co-Vers.	Cosec.	Tang.	Cotan.	Secant.	Ver. Sin.	Cosine.		
30	0	.50000	.50000	2.0000	.57735	1.7320	1.1547	.13397	.86603	60	0
	15	.50377	.49623	1.9850	.58318	1.7147	1.1576	.13616	.86384		45
	30	.50754	.49246	1.9703	.58904	1.6977	1.1606	.13837	.86163		30
	45	.51129	.48871	1.9558	.59494	1.6808	1.1636	.14059	.85941		15
31	0	.51504	.48496	1.9416	.60086	1.6643	1.1666	.14283	.85717	59	0
	15	.51877	.48123	1.9276	.60681	1.6479	1.1697	.14509	.85491		45
	30	.52250	.47750	1.9139	.61280	1.6319	1.1728	.14736	.85264		30
	45	.52621	.47379	1.9004	.61882	1.6160	1.1760	.14965	.85035		15
32	0	.52992	.47008	1.8871	.62487	1.6003	1.1792	.15195	.84805	58	0
	15	.53361	.46639	1.8740	.63095	1.5849	1.1824	.15427	.84573		45
	30	.53730	.46270	1.8612	.63707	1.5697	1.1857	.15661	.84339		30
	45	.54097	.45903	1.8485	.64322	1.5547	1.1890	.15896	.84104		15
33	0	.54464	.45536	1.8361	.64941	1.5399	1.1924	.16133	.83867	57	0
	15	.54829	.45171	1.8238	.65563	1.5253	1.1958	.16371	.83629		45
	30	.55194	.44806	1.8118	.66188	1.5108	1.1992	.16611	.83389		30
	45	.55557	.44443	1.7999	.66818	1.4966	1.2027	.16853	.83147		15
34	0	.55919	.44081	1.7883	.67451	1.4826	1.2062	.17096	.82904	56	0
	15	.56280	.43720	1.7768	.68087	1.4687	1.2098	.17341	.82659		45
	30	.56641	.43359	1.7655	.68728	1.4550	1.2134	.17587	.82413		30
	45	.57000	.43000	1.7544	.69372	1.4415	1.2171	.17835	.82165		15
35	0	.57358	.42642	1.7434	.70021	1.4281	1.2208	.18085	.81915	55	0
	15	.57715	.42285	1.7327	.70673	1.4150	1.2245	.18336	.81664		45
	30	.58070	.41930	1.7220	.71329	1.4019	1.2283	.18588	.81412		30
	45	.58425	.41575	1.7116	.71990	1.3891	1.2322	.18843	.81157		15
36	0	.58779	.41221	1.7013	.72654	1.3764	1.2361	.19098	.80902	54	0
	15	.59131	.40869	1.6912	.73323	1.3638	1.2400	.19356	.80644		45
	30	.59482	.40518	1.6812	.73996	1.3514	1.2440	.19614	.80386		30
	45	.59832	.40168	1.6713	.74673	1.3392	1.2480	.19875	.80125		15
37	0	.60181	.39819	1.6616	.75355	1.3270	1.2521	.20136	.79864	53	0
	15	.60529	.39471	1.6521	.76042	1.3151	1.2563	.20400	.79600		45
	30	.60876	.39124	1.6427	.76733	1.3032	1.2605	.20665	.79335		30
	45	.61222	.38778	1.6334	.77428	1.2915	1.2647	.20931	.79069		15
38	0	.61566	.38434	1.6243	.78129	1.2799	1.2690	.21199	.78801	52	0
	15	.61909	.38091	1.6153	.78834	1.2685	1.2734	.21468	.78532		45
	30	.62251	.37749	1.6064	.79543	1.2572	1.2778	.21739	.78261		30
	45	.62592	.37408	1.5976	.80258	1.2460	1.2822	.22012	.77988		15
39	0	.62932	.37068	1.5890	.80978	1.2349	1.2868	.22285	.77715	51	0
	15	.63271	.36729	1.5805	.81703	1.2239	1.2913	.22561	.77439		45
	30	.63608	.36392	1.5721	.82434	1.2131	1.2960	.22838	.77162		30
	45	.63944	.36056	1.5639	.83169	1.2024	1.3007	.23116	.76884		15
40	0	.64279	.35721	1.5557	.83910	1.1918	1.3054	.23396	.76604	50	0
	15	.64612	.35388	1.5477	.84658	1.1812	1.3102	.23677	.76323		45
	30	.64945	.35055	1.5398	.85408	1.1708	1.3151	.23959	.76041		30
	45	.65276	.34724	1.5320	.86165	1.1606	1.3200	.24244	.75756		15
41	0	.65606	.34394	1.5242	.86929	1.1504	1.3250	.24529	.75471	49	0
	15	.65935	.34065	1.5166	.87698	1.1403	1.3301	.24816	.75184		45
	30	.66262	.33738	1.5092	.88472	1.1303	1.3352	.25104	.74896		30
	45	.66588	.33412	1.5018	.89253	1.1204	1.3404	.25394	.74606		15
42	0	.66913	.33087	1.4945	.90040	1.1106	1.3456	.25686	.74314	48	0
	15	.67237	.32763	1.4873	.90834	1.1009	1.3509	.25978	.74022		45
	30	.67559	.32441	1.4802	.91632	1.0913	1.3563	.26272	.73728		30
	45	.67880	.32120	1.4732	.92439	1.0818	1.3618	.26568	.73432		15
43	0	.68200	.31800	1.4663	.93251	1.0724	1.3673	.26865	.73135	47	0
	15	.68518	.31482	1.4595	.94071	1.0630	1.3729	.27163	.72837		45
	30	.68835	.31165	1.4527	.94896	1.0538	1.3786	.27463	.72537		30
	45	.69151	.30849	1.4461	.95729	1.0446	1.3843	.27764	.72236		15
44	0	.69466	.30534	1.4396	.96569	1.0355	1.3902	.28066	.71934	46	0
	15	.69779	.30221	1.4331	.97416	1.0265	1.3961	.28370	.71630		45
	30	.70091	.29909	1.4267	.98270	1.0176	1.4020	.28675	.71325		30
	45	.70401	.29599	1.4204	.99131	1.0088	1.4081	.28981	.71019		15
45	0	.70711	.29289	1.4142	1.0000	1.0000	1.4142	.29289	.70711	45	0
		Cosine.	Ver. Sin.	Secant.	Cotan.	Tang.	Cosec.	Co-Vers.	Sine.	°	M.

From 45° to 60° read from bottom of table upwards.

CIRCUMFERENCES AND AREAS OF CIRCLES.

Diameter from $\frac{1}{64}$ to 100, advancing chiefly by Eighths.

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
$\frac{1}{64}$	.04909	.00019	2. $\frac{1}{8}$	6.8759	3.5466	5. $\frac{1}{8}$	17.082	23.221
$\frac{1}{32}$	.09818	.00077	$\frac{3}{16}$	6.8722	3.7583	$\frac{1}{2}$	17.279	23.758
$\frac{3}{64}$	.14726	.00173	$\frac{1}{4}$	7.0686	3.9761	$\frac{5}{8}$	17.475	24.301
$\frac{1}{16}$	.19635	.00307	$\frac{5}{16}$	7.2649	4.2000	$\frac{3}{4}$	17.671	24.850
$\frac{1}{8}$	.29452	.00690	$\frac{3}{8}$	7.4613	4.4301	$\frac{7}{8}$	17.868	25.406
$\frac{1}{4}$	.39270	.01227	$\frac{1}{2}$	7.6576	4.6664	$\frac{1}{16}$	18.064	25.967
$\frac{3}{8}$	.49087	.01917	$\frac{3}{4}$	7.8540	4.9087	$\frac{1}{8}$	18.261	26.535
$\frac{1}{2}$	.58905	.02761	$\frac{1}{16}$	8.0503	5.1572	$\frac{3}{16}$	18.457	27.109
$\frac{3}{4}$	.68722	.03758	$\frac{1}{8}$	8.2467	5.4119	$\frac{1}{4}$	18.653	27.688
$\frac{1}{2}$	.78540	.04909	$\frac{3}{16}$	8.4430	5.6727			
$\frac{3}{8}$	.88357	.06213	$\frac{1}{4}$	8.6394	5.9396	6. $\frac{1}{8}$	18.850	28.274
$\frac{1}{4}$	.98175	.07670	$\frac{5}{16}$	8.8357	6.2126	$\frac{1}{4}$	19.242	29.465
$\frac{3}{16}$	1.0799	.09281	$\frac{3}{8}$	9.0321	6.4918	$\frac{3}{8}$	19.635	30.680
$\frac{1}{8}$	1.1781	.11045	$\frac{1}{2}$	9.2284	6.7771	$\frac{1}{2}$	20.028	31.919
$\frac{3}{16}$	1.2763	.12962	3. $\frac{1}{8}$	9.4248	7.0686	$\frac{5}{8}$	20.420	33.183
$\frac{1}{4}$	1.3744	.15033	$\frac{1}{16}$	9.6211	7.3662	$\frac{3}{4}$	20.813	34.472
$\frac{3}{8}$	1.4726	.17257	$\frac{1}{8}$	9.8175	7.6699	$\frac{7}{8}$	21.206	35.785
			$\frac{3}{16}$	10.014	7.9798		21.598	37.122
$\frac{1}{2}$	1.5708	.19635	$\frac{1}{4}$	10.210	8.2958	7. $\frac{1}{8}$	21.991	38.485
$\frac{3}{8}$	1.6690	.22166	$\frac{5}{16}$	10.407	8.6179	$\frac{1}{4}$	22.384	39.871
$\frac{1}{4}$	1.7671	.24850	$\frac{3}{8}$	10.603	8.9462	$\frac{3}{8}$	22.776	41.282
$\frac{3}{16}$	1.8653	.27688	$\frac{1}{2}$	10.799	9.2806	$\frac{1}{2}$	23.169	42.718
$\frac{1}{8}$	1.9635	.30680	$\frac{3}{4}$	10.996	9.6211	$\frac{5}{8}$	23.562	44.179
$\frac{3}{16}$	2.0617	.33824	$\frac{1}{16}$	11.192	9.9678	$\frac{3}{4}$	23.955	45.664
$\frac{1}{4}$	2.1598	.37122	$\frac{5}{16}$	11.388	10.321	$\frac{7}{8}$	24.347	47.173
$\frac{3}{8}$	2.2580	.40574	$\frac{1}{8}$	11.585	10.680		24.740	48.707
			$\frac{3}{16}$	11.781	11.045	8. $\frac{1}{8}$	25.133	50.265
$\frac{1}{2}$	2.3562	.44179	$\frac{1}{4}$	11.977	11.416	$\frac{1}{4}$	25.525	51.849
$\frac{3}{8}$	2.4544	.47937	$\frac{5}{16}$	12.174	11.793	$\frac{3}{8}$	25.918	53.456
$\frac{1}{4}$	2.5525	.51849	$\frac{3}{8}$	12.370	12.177	$\frac{1}{2}$	26.311	55.088
$\frac{3}{16}$	2.6507	.55914	4. $\frac{1}{8}$	12.566	12.566	$\frac{5}{8}$	26.704	56.745
$\frac{1}{8}$	2.7489	.60132	$\frac{1}{16}$	12.763	12.962	$\frac{3}{4}$	27.096	58.426
$\frac{3}{16}$	2.8471	.64504	$\frac{1}{8}$	12.959	13.364	$\frac{7}{8}$	27.489	60.132
$\frac{1}{4}$	2.9452	.69029	$\frac{3}{16}$	13.155	13.772		27.882	61.862
$\frac{3}{8}$	3.0434	.73708	$\frac{1}{4}$	13.352	14.186	9. $\frac{1}{8}$	28.274	63.617
			$\frac{5}{16}$	13.548	14.607	$\frac{1}{4}$	28.667	65.397
1. $\frac{1}{8}$	3.1416	.7854	$\frac{3}{8}$	13.744	15.033	$\frac{3}{8}$	29.060	67.201
$\frac{3}{16}$	3.3379	.8866	$\frac{1}{2}$	13.941	15.466	$\frac{1}{2}$	29.452	69.029
$\frac{1}{4}$	3.5343	.9940	$\frac{3}{4}$	14.137	15.904	$\frac{5}{8}$	29.845	70.882
$\frac{3}{8}$	3.7306	1.1075	$\frac{1}{16}$	14.334	16.349	$\frac{3}{4}$	30.238	72.760
$\frac{1}{2}$	3.9270	1.2272	$\frac{5}{16}$	14.530	16.800	$\frac{7}{8}$	30.631	74.662
$\frac{3}{4}$	4.1233	1.3530	$\frac{1}{8}$	14.726	17.257		31.023	76.589
$\frac{1}{16}$	4.3197	1.4849	$\frac{3}{16}$	14.923	17.728			
$\frac{1}{8}$	4.5160	1.6230	$\frac{1}{4}$	15.119	18.190			
$\frac{3}{16}$	4.7124	1.7671	$\frac{5}{16}$	15.315	18.665			
$\frac{1}{4}$	4.9087	1.9175	$\frac{3}{8}$	15.512	19.147			
$\frac{3}{8}$	5.1051	2.0739				10. $\frac{1}{8}$	31.416	78.540
$\frac{1}{2}$	5.3014	2.2365				$\frac{1}{4}$	31.809	80.516
$\frac{3}{4}$	5.4978	2.4053	5. $\frac{1}{8}$	15.708	19.635	$\frac{3}{8}$	32.201	82.516
$\frac{1}{16}$	5.6941	2.5802	$\frac{1}{16}$	15.904	20.129	$\frac{1}{2}$	32.594	84.541
$\frac{1}{8}$	5.8905	2.7612	$\frac{3}{16}$	16.101	20.629	$\frac{5}{8}$	32.987	86.590
$\frac{3}{8}$	6.0868	2.9483	$\frac{1}{4}$	16.297	21.135	$\frac{3}{4}$	33.379	88.664
			$\frac{5}{16}$	16.493	21.648	$\frac{7}{8}$	33.772	90.763
2. $\frac{1}{8}$	6.2832	3.1416	$\frac{3}{8}$	16.690	22.166		34.165	92.886
$\frac{3}{16}$	6.4795	3.3410	$\frac{1}{2}$	16.886	22.691	11. $\frac{1}{8}$	34.558	95.033

CIRCUMFERENCES AND AREAS OF CIRCLES.

(CONTINUED.)

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
11. $\frac{1}{8}$	34.950	97.205	17. $\frac{3}{8}$	54.585	237.10	23. $\frac{5}{8}$	74.220	438.36
$\frac{1}{4}$	35.343	99.402	$\frac{1}{2}$	54.978	240.53	$\frac{3}{4}$	74.613	443.01
$\frac{3}{8}$	35.736	101.62	$\frac{5}{8}$	55.371	243.98	$\frac{7}{8}$	75.006	447.69
$\frac{1}{2}$	36.128	103.87	$\frac{3}{4}$	55.763	247.45			
$\frac{5}{8}$	36.521	106.14	$\frac{7}{8}$	56.156	250.95	24. $\frac{1}{8}$	75.398	452.39
$\frac{3}{4}$	36.914	108.43				$\frac{1}{4}$	75.791	457.11
$\frac{7}{8}$	37.306	110.75	18. $\frac{1}{8}$	56.549	254.47	$\frac{3}{8}$	76.184	461.86
			$\frac{1}{4}$	56.941	258.02	$\frac{1}{2}$	76.576	466.64
12. $\frac{1}{8}$	37.699	113.10	$\frac{3}{8}$	57.334	261.59	$\frac{3}{4}$	76.969	471.44
$\frac{1}{4}$	38.092	115.47	$\frac{1}{2}$	57.727	265.18	$\frac{5}{8}$	77.362	476.26
$\frac{3}{8}$	38.485	117.86	$\frac{5}{8}$	58.119	268.80	$\frac{3}{4}$	77.754	481.11
$\frac{1}{2}$	38.877	120.28	$\frac{7}{8}$	58.512	272.45	$\frac{7}{8}$	78.147	485.98
$\frac{5}{8}$	39.270	122.72	$\frac{3}{4}$	58.905	276.12			
$\frac{3}{4}$	39.663	125.19	$\frac{7}{8}$	59.298	279.81	25. $\frac{1}{8}$	78.540	490.87
$\frac{7}{8}$	40.055	127.68				$\frac{1}{4}$	78.933	495.79
$\frac{7}{8}$	40.448	130.19	19. $\frac{1}{8}$	59.690	283.53	$\frac{1}{4}$	79.325	500.74
			$\frac{1}{4}$	60.083	287.27	$\frac{3}{8}$	79.718	505.71
13. $\frac{1}{8}$	40.841	132.73	$\frac{3}{8}$	60.476	291.04	$\frac{1}{2}$	80.111	510.71
$\frac{1}{4}$	41.233	135.30	$\frac{1}{2}$	60.868	294.83	$\frac{5}{8}$	80.503	515.72
$\frac{3}{8}$	41.626	137.89	$\frac{5}{8}$	61.261	298.65	$\frac{3}{4}$	80.896	520.77
$\frac{1}{2}$	42.019	140.50	$\frac{7}{8}$	61.654	302.49	$\frac{7}{8}$	81.289	525.84
$\frac{5}{8}$	42.412	143.14	$\frac{3}{4}$	62.046	306.35			
$\frac{3}{4}$	42.804	145.80	$\frac{7}{8}$	62.439	310.24	26. $\frac{1}{8}$	81.681	530.93
$\frac{7}{8}$	43.197	148.49				$\frac{1}{4}$	82.074	536.05
$\frac{7}{8}$	43.590	151.20	20. $\frac{1}{8}$	62.832	314.16	$\frac{1}{4}$	82.467	541.19
			$\frac{1}{4}$	63.225	318.10	$\frac{3}{8}$	82.860	546.35
14. $\frac{1}{8}$	43.982	153.94	$\frac{3}{8}$	63.617	322.06	$\frac{1}{2}$	83.252	551.55
$\frac{1}{4}$	44.375	156.70	$\frac{1}{2}$	64.010	326.05	$\frac{5}{8}$	83.645	556.76
$\frac{3}{8}$	44.768	159.48	$\frac{5}{8}$	64.403	330.06	$\frac{3}{4}$	84.038	562.00
$\frac{1}{2}$	45.160	162.30	$\frac{7}{8}$	64.795	334.10	$\frac{7}{8}$	84.430	567.27
$\frac{5}{8}$	45.553	165.13	$\frac{3}{4}$	65.188	338.16			
$\frac{3}{4}$	45.946	167.99	$\frac{7}{8}$	65.581	342.25	27. $\frac{1}{8}$	84.823	572.56
$\frac{7}{8}$	46.338	170.87				$\frac{1}{4}$	85.216	577.87
$\frac{7}{8}$	46.731	173.78	21. $\frac{1}{8}$	65.973	346.36	$\frac{1}{4}$	85.608	583.21
			$\frac{1}{4}$	66.366	350.50	$\frac{3}{8}$	86.001	588.57
15. $\frac{1}{8}$	47.124	176.71	$\frac{3}{8}$	66.759	354.66	$\frac{1}{2}$	86.394	593.96
$\frac{1}{4}$	47.517	179.67	$\frac{1}{2}$	67.152	358.84	$\frac{5}{8}$	86.786	599.37
$\frac{3}{8}$	47.909	182.65	$\frac{5}{8}$	67.544	363.05	$\frac{3}{4}$	87.179	604.81
$\frac{1}{2}$	48.302	185.66	$\frac{7}{8}$	67.937	367.28	$\frac{7}{8}$	87.572	610.27
$\frac{5}{8}$	48.695	188.69	$\frac{3}{4}$	68.330	371.54			
$\frac{3}{4}$	49.087	191.75	$\frac{7}{8}$	68.722	375.83	28. $\frac{1}{8}$	87.965	615.75
$\frac{7}{8}$	49.480	194.83				$\frac{1}{4}$	88.357	621.26
$\frac{7}{8}$	49.873	197.93	22. $\frac{1}{8}$	69.115	380.13	$\frac{1}{4}$	88.750	626.80
			$\frac{1}{4}$	69.508	384.46	$\frac{3}{8}$	89.143	632.36
16. $\frac{1}{8}$	50.265	201.06	$\frac{3}{8}$	69.900	388.82	$\frac{1}{2}$	89.535	637.94
$\frac{1}{4}$	50.658	204.22	$\frac{1}{2}$	70.293	393.20	$\frac{5}{8}$	89.928	643.55
$\frac{3}{8}$	51.051	207.39	$\frac{5}{8}$	70.686	397.61	$\frac{3}{4}$	90.321	649.18
$\frac{1}{2}$	51.444	210.60	$\frac{7}{8}$	71.079	402.04	$\frac{7}{8}$	90.713	654.84
$\frac{5}{8}$	51.836	213.82	$\frac{3}{4}$	71.471	406.49			
$\frac{3}{4}$	52.229	217.08	$\frac{7}{8}$	71.864	410.97	29. $\frac{1}{8}$	91.106	660.52
$\frac{7}{8}$	52.622	220.35				$\frac{1}{4}$	91.499	666.23
$\frac{7}{8}$	53.014	223.65	23. $\frac{1}{8}$	72.257	415.48	$\frac{1}{4}$	91.892	671.96
			$\frac{1}{4}$	72.649	420.00	$\frac{3}{8}$	92.284	677.71
17. $\frac{1}{8}$	53.407	226.98	$\frac{3}{8}$	73.042	424.56	$\frac{1}{2}$	92.677	683.49
$\frac{1}{4}$	53.800	230.33	$\frac{1}{2}$	73.435	429.13	$\frac{5}{8}$	93.070	689.30
$\frac{3}{4}$	54.192	233.71	$\frac{7}{8}$	73.827	433.74	$\frac{3}{4}$	93.462	695.13

CIRCUMFERENCES AND AREAS OF CIRCLES.

(CONTINUED.)

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
29. $\frac{7}{8}$	93.855	700.98	36. $\frac{1}{8}$	113.490	1025.0	42. $\frac{3}{8}$	133.125	1410.3
30.			36. $\frac{1}{4}$	113.883	1032.1	42. $\frac{1}{2}$	133.518	1418.6
30. $\frac{1}{8}$	94.248	706.86	36. $\frac{3}{8}$	114.275	1039.2	42. $\frac{5}{8}$	133.910	1427.0
30. $\frac{1}{4}$	94.640	712.76	36. $\frac{1}{2}$	114.668	1046.3	42. $\frac{3}{4}$	134.303	1435.4
30. $\frac{3}{8}$	95.033	718.69	36. $\frac{5}{8}$	115.061	1053.5	42. $\frac{7}{8}$	134.696	1443.8
30. $\frac{1}{2}$	95.426	724.64	36. $\frac{3}{4}$	115.454	1060.7			
30. $\frac{5}{8}$	95.819	730.62	36. $\frac{7}{8}$	115.846	1068.0	43.		
30. $\frac{3}{4}$	96.211	736.62				43. $\frac{1}{8}$	135.088	1452.2
30. $\frac{7}{8}$	96.604	742.64	37.			43. $\frac{1}{4}$	135.481	1460.7
	96.997	748.69	37. $\frac{1}{8}$	116.239	1075.2	43. $\frac{1}{2}$	135.874	1469.1
31.			37. $\frac{1}{4}$	116.633	1082.5	43. $\frac{3}{8}$	136.267	1477.6
31. $\frac{1}{8}$	97.389	754.77	37. $\frac{3}{8}$	117.024	1089.8	43. $\frac{1}{2}$	136.659	1486.2
31. $\frac{1}{4}$	97.782	760.87	37. $\frac{1}{2}$	117.417	1097.1	43. $\frac{5}{8}$	137.052	1494.7
31. $\frac{3}{8}$	98.175	766.99	37. $\frac{3}{4}$	117.810	1104.5	43. $\frac{7}{8}$	137.445	1503.3
31. $\frac{1}{2}$	98.567	773.14	37. $\frac{5}{8}$	118.202	1111.8		137.837	1511.9
31. $\frac{3}{4}$	98.960	779.31	37. $\frac{7}{8}$	118.596	1119.2			
31. $\frac{7}{8}$	99.353	785.51		118.988	1126.7	44.		
32.			38.			44. $\frac{1}{8}$	138.230	1520.5
32. $\frac{1}{8}$	100.138	797.98	38. $\frac{1}{4}$	119.381	1134.1	44. $\frac{1}{4}$	138.623	1529.2
32. $\frac{1}{4}$	100.531	804.25	38. $\frac{3}{8}$	119.773	1141.6	44. $\frac{3}{8}$	139.015	1537.9
32. $\frac{1}{2}$	100.924	810.54	38. $\frac{1}{2}$	120.166	1149.1	44. $\frac{1}{2}$	139.408	1546.6
32. $\frac{3}{8}$	101.316	816.86	38. $\frac{3}{4}$	120.559	1156.6	44. $\frac{5}{8}$	139.801	1555.3
32. $\frac{1}{2}$	101.709	823.21	38. $\frac{7}{8}$	120.951	1164.2	44. $\frac{3}{4}$	140.194	1564.0
32. $\frac{5}{8}$	102.102	829.58		121.344	1171.7	44. $\frac{7}{8}$	140.586	1572.8
32. $\frac{3}{4}$	102.494	835.97		121.737	1179.3		140.979	1581.6
32. $\frac{7}{8}$	102.887	842.39	39.			45.		
33.			39. $\frac{1}{8}$	122.129	1186.9	45. $\frac{1}{8}$	141.372	1590.4
33. $\frac{1}{8}$	103.673	855.30	39. $\frac{1}{4}$	122.522	1194.6	45. $\frac{1}{4}$	141.764	1599.3
33. $\frac{1}{4}$	104.065	861.79	39. $\frac{3}{8}$	122.915	1202.3	45. $\frac{3}{8}$	142.157	1608.2
33. $\frac{1}{2}$	104.458	868.31	39. $\frac{1}{2}$	123.308	1210.0	45. $\frac{1}{2}$	142.550	1617.0
33. $\frac{3}{8}$	104.851	874.85	39. $\frac{3}{4}$	123.700	1217.7	45. $\frac{5}{8}$	142.942	1626.0
33. $\frac{1}{2}$	105.243	881.41	39. $\frac{7}{8}$	124.093	1225.4	45. $\frac{3}{4}$	143.335	1634.9
33. $\frac{5}{8}$	105.636	888.00		124.486	1233.2	45. $\frac{7}{8}$	143.728	1643.9
33. $\frac{3}{4}$	106.029	894.62		124.878	1241.0		144.121	1652.9
33. $\frac{7}{8}$	106.421	901.26	40.			46.		
34.			40. $\frac{1}{8}$	125.271	1248.8	46. $\frac{1}{8}$	144.513	1661.9
34. $\frac{1}{8}$	106.814	907.92	40. $\frac{1}{4}$	125.664	1256.6	46. $\frac{1}{4}$	144.906	1670.9
34. $\frac{1}{4}$	107.207	914.61	40. $\frac{3}{8}$	126.056	1264.5	46. $\frac{3}{8}$	145.299	1680.0
34. $\frac{3}{8}$	107.600	921.32	40. $\frac{1}{2}$	126.449	1272.4	46. $\frac{1}{2}$	145.691	1689.1
34. $\frac{1}{2}$	107.992	928.06	40. $\frac{3}{4}$	126.842	1280.3	46. $\frac{5}{8}$	146.084	1698.2
34. $\frac{5}{8}$	108.385	934.82	40. $\frac{7}{8}$	127.235	1288.2	46. $\frac{3}{4}$	146.477	1707.4
34. $\frac{3}{4}$	108.778	941.61		127.627	1296.2	46. $\frac{7}{8}$	146.869	1716.5
34. $\frac{7}{8}$	109.170	948.42	41.				147.262	1725.7
35.			41. $\frac{1}{8}$	128.020	1304.2	47.		
35. $\frac{1}{8}$	109.563	955.25	41. $\frac{1}{4}$	128.413	1312.2	47. $\frac{1}{8}$	147.655	1734.9
35. $\frac{1}{4}$	109.956	962.11	41. $\frac{3}{8}$	128.805	1320.3	47. $\frac{1}{4}$	148.048	1744.2
35. $\frac{1}{2}$	110.348	969.00	41. $\frac{1}{2}$	129.198	1328.3	47. $\frac{3}{8}$	148.440	1753.5
35. $\frac{3}{8}$	110.741	975.91	41. $\frac{3}{4}$	129.591	1336.4	47. $\frac{1}{2}$	148.833	1762.7
35. $\frac{1}{2}$	111.134	982.84	41. $\frac{5}{8}$	129.983	1344.5	47. $\frac{5}{8}$	149.226	1772.1
35. $\frac{3}{4}$	111.527	989.80	41. $\frac{7}{8}$	130.376	1352.7	47. $\frac{3}{4}$	149.618	1781.4
35. $\frac{7}{8}$	111.919	996.78		130.769	1360.8	47. $\frac{7}{8}$	150.011	1790.8
36.			42.				150.404	1800.1
36. $\frac{1}{8}$	112.312	1003.8	42. $\frac{1}{8}$	131.161	1369.0	48.		
36. $\frac{1}{4}$	112.705	1010.8	42. $\frac{1}{4}$	131.554	1377.2	48. $\frac{1}{8}$	150.796	1809.6
36. $\frac{3}{8}$	113.097	1017.9		131.947	1385.4	48. $\frac{1}{4}$	151.189	1819.0
				132.340	1393.7	48. $\frac{3}{8}$	151.582	1828.5
				132.732	1402.0	48. $\frac{1}{2}$	151.975	1837.9
							152.367	1847.5

CIRCUMFERENCES AND AREAS OF CIRCLES.

(CONTINUED.)

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
48. $\frac{5}{8}$	152.760	1857.0	54. $\frac{7}{8}$	172.395	2365.0	61. $\frac{1}{8}$	191.637	2922.5
$\frac{3}{4}$	153.153	1866.5				$\frac{1}{4}$	192.030	2934.5
$\frac{7}{8}$	153.545	1876.1	55. $\frac{1}{8}$	172.788	2375.8	$\frac{3}{8}$	192.423	2946.5
49. $\frac{1}{8}$	153.938	1885.7	$\frac{1}{4}$	173.180	2386.6	$\frac{1}{2}$	192.815	2958.5
$\frac{1}{4}$	154.331	1895.4	$\frac{3}{8}$	173.573	2397.5	$\frac{5}{8}$	193.208	2970.6
$\frac{3}{8}$	154.723	1905.0	$\frac{1}{2}$	173.966	2408.3	$\frac{3}{4}$	193.601	2982.7
$\frac{1}{2}$	155.116	1914.7	$\frac{5}{8}$	174.358	2419.2	$\frac{7}{8}$	193.993	2994.8
$\frac{5}{8}$	155.509	1924.4	$\frac{3}{4}$	174.751	2430.1		194.386	3006.9
$\frac{3}{4}$	155.902	1934.2	$\frac{7}{8}$	175.144	2441.1	62. $\frac{1}{8}$	194.779	3019.1
$\frac{7}{8}$	156.294	1943.9		175.536	2452.0	$\frac{1}{4}$	195.171	3031.3
50. $\frac{1}{8}$	156.687	1953.7	56. $\frac{1}{8}$	175.929	2463.0	$\frac{1}{4}$	195.564	3043.5
$\frac{1}{4}$	157.080	1963.5	$\frac{1}{4}$	176.322	2474.0	$\frac{3}{8}$	195.957	3055.7
$\frac{1}{8}$	157.472	1973.3	$\frac{3}{8}$	176.715	2485.0	$\frac{1}{2}$	196.350	3068.0
$\frac{1}{4}$	157.865	1983.2	$\frac{1}{2}$	177.107	2496.1	$\frac{5}{8}$	196.742	3080.3
$\frac{3}{8}$	158.258	1993.1	$\frac{5}{8}$	177.500	2507.2	$\frac{3}{4}$	197.135	3092.6
$\frac{1}{2}$	158.650	2003.0	$\frac{3}{4}$	177.893	2518.3	$\frac{7}{8}$	197.528	3104.9
$\frac{5}{8}$	159.043	2012.9	$\frac{7}{8}$	178.285	2529.4	63. $\frac{1}{8}$	197.920	3117.2
$\frac{3}{4}$	159.436	2022.8		178.678	2540.6	$\frac{1}{4}$	198.313	3129.6
$\frac{7}{8}$	159.829	2032.8	57. $\frac{1}{8}$	179.071	2551.8	$\frac{1}{4}$	198.706	3142.0
51. $\frac{1}{8}$	160.221	2042.8	$\frac{1}{4}$	179.463	2563.0	$\frac{3}{8}$	199.098	3154.5
$\frac{1}{4}$	160.614	2052.8	$\frac{3}{8}$	179.856	2574.2	$\frac{1}{2}$	199.491	3166.9
$\frac{1}{8}$	161.007	2062.9	$\frac{1}{2}$	180.249	2585.4	$\frac{5}{8}$	199.884	3179.4
$\frac{1}{4}$	161.399	2073.0	$\frac{5}{8}$	180.642	2596.7	$\frac{3}{4}$	200.277	3191.9
$\frac{3}{8}$	161.792	2083.1	$\frac{3}{4}$	181.034	2608.0	$\frac{7}{8}$	200.669	3204.4
$\frac{1}{2}$	162.185	2093.2	$\frac{7}{8}$	181.427	2619.4	64. $\frac{1}{8}$	201.062	3217.0
$\frac{5}{8}$	162.577	2103.3		181.820	2630.7	$\frac{1}{4}$	201.455	3229.6
$\frac{3}{4}$	162.970	2113.5	58. $\frac{1}{8}$	182.212	2642.1	$\frac{1}{4}$	201.847	3242.2
$\frac{7}{8}$			$\frac{1}{4}$	182.605	2653.5	$\frac{3}{8}$	202.240	3254.8
52. $\frac{1}{8}$	163.363	2123.7	$\frac{1}{4}$	182.998	2664.9	$\frac{1}{2}$	202.633	3267.5
$\frac{1}{4}$	163.756	2133.9	$\frac{3}{8}$	183.390	2676.4	$\frac{5}{8}$	203.025	3280.1
$\frac{1}{4}$	164.148	2144.2	$\frac{1}{2}$	183.783	2687.8	$\frac{3}{4}$	203.418	3292.8
$\frac{3}{8}$	164.541	2154.5	$\frac{5}{8}$	184.176	2699.3	$\frac{7}{8}$	203.811	3305.6
$\frac{1}{2}$	164.934	2164.8	$\frac{3}{4}$	184.569	2710.9	65. $\frac{1}{8}$	204.204	3318.3
$\frac{5}{8}$	165.326	2175.1	$\frac{7}{8}$	184.961	2722.4	$\frac{1}{4}$	204.596	3331.1
$\frac{3}{4}$	165.719	2185.4	59. $\frac{1}{8}$	185.354	2734.0	$\frac{1}{4}$	204.989	3343.9
$\frac{7}{8}$	166.112	2195.8	$\frac{1}{4}$	185.747	2745.6	$\frac{3}{8}$	205.382	3356.7
53. $\frac{1}{8}$	166.504	2206.2	$\frac{1}{4}$	186.139	2757.2	$\frac{1}{2}$	205.774	3369.6
$\frac{1}{4}$	166.897	2216.6	$\frac{3}{8}$	186.532	2768.8	$\frac{5}{8}$	206.167	3382.4
$\frac{1}{4}$	167.290	2227.0	$\frac{1}{2}$	186.925	2780.5	$\frac{3}{4}$	206.560	3395.3
$\frac{3}{8}$	167.683	2237.5	$\frac{5}{8}$	187.317	2792.2	$\frac{7}{8}$	206.952	3408.2
$\frac{1}{2}$	168.075	2248.0	$\frac{3}{4}$	187.710	2803.9	66. $\frac{1}{8}$	207.345	3421.2
$\frac{5}{8}$	168.468	2258.5	$\frac{7}{8}$	188.103	2815.7	$\frac{1}{4}$	207.738	3434.2
$\frac{3}{4}$	168.861	2269.1	60. $\frac{1}{8}$	188.496	2827.4	$\frac{1}{4}$	208.131	3447.2
$\frac{7}{8}$	169.253	2279.6	$\frac{1}{4}$	188.888	2839.2	$\frac{3}{8}$	208.523	3460.2
54. $\frac{1}{8}$	169.646	2290.2	$\frac{1}{4}$	189.281	2851.0	$\frac{1}{2}$	208.916	3473.2
$\frac{1}{4}$	170.039	2300.8	$\frac{3}{8}$	189.674	2862.9	$\frac{5}{8}$	209.309	3486.3
$\frac{1}{4}$	170.431	2311.5	$\frac{1}{2}$	190.066	2874.8	$\frac{3}{4}$	209.701	3499.4
$\frac{3}{8}$	170.824	2322.1	$\frac{5}{8}$	190.459	2886.6	$\frac{7}{8}$	210.094	3512.5
$\frac{1}{2}$	171.217	2332.8	$\frac{3}{4}$	190.852	2898.6	67. $\frac{1}{8}$	210.487	3525.7
$\frac{5}{8}$	171.609	2343.5	$\frac{7}{8}$	191.244	2910.5		210.879	3538.8
$\frac{3}{4}$	172.002	2354.3						

CIRCUMFERENCES AND AREAS OF CIRCLES.

(CONTINUED.)

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
67. $\frac{1}{8}$	211.272	3552.0	73. $\frac{1}{8}$	230.907	4242.9	79. $\frac{3}{8}$	250.542	4995.2
$\frac{3}{8}$	211.665	3565.2	$\frac{5}{8}$	231.300	4257.4	$\frac{7}{8}$	250.935	5010.9
$\frac{1}{2}$	212.058	3578.5	$\frac{3}{4}$	231.692	4271.8	80.	251.327	5026.5
$\frac{5}{8}$	212.450	3591.7	$\frac{7}{8}$	232.085	4286.3	$\frac{1}{8}$	251.720	5042.3
$\frac{3}{4}$	212.843	3605.0	74.	232.478	4300.8	$\frac{1}{4}$	252.113	5058.0
$\frac{7}{8}$	213.236	3618.3	$\frac{1}{8}$	232.871	4315.4	$\frac{3}{8}$	252.506	5073.8
68.	213.628	3631.7	$\frac{1}{4}$	233.263	4329.9	$\frac{1}{2}$	252.898	5089.6
$\frac{1}{8}$	214.021	3645.0	$\frac{3}{8}$	233.656	4344.5	$\frac{5}{8}$	253.291	5105.4
$\frac{1}{4}$	214.414	3658.4	$\frac{1}{2}$	234.049	4359.2	$\frac{3}{4}$	253.684	5121.2
$\frac{3}{8}$	214.806	3671.8	$\frac{5}{8}$	234.441	4373.8	$\frac{7}{8}$	254.076	5137.1
$\frac{1}{2}$	215.199	3685.3	$\frac{3}{4}$	234.834	4388.5	81.	254.469	5153.0
$\frac{5}{8}$	215.592	3698.7	$\frac{7}{8}$	235.227	4403.1	$\frac{1}{8}$	254.862	5168.9
$\frac{3}{4}$	215.984	3712.2	75.	235.619	4417.9	$\frac{1}{4}$	255.254	5184.9
$\frac{7}{8}$	216.377	3725.7	$\frac{1}{8}$	236.012	4432.6	$\frac{1}{4}$	255.647	5200.8
69.	216.770	3739.3	$\frac{1}{4}$	236.405	4447.4	$\frac{3}{8}$	256.040	5216.8
$\frac{1}{8}$	217.163	3752.8	$\frac{3}{8}$	236.798	4462.2	$\frac{1}{2}$	256.433	5232.8
$\frac{1}{4}$	217.555	3766.4	$\frac{1}{2}$	237.190	4477.0	$\frac{3}{4}$	256.825	5248.9
$\frac{3}{8}$	217.948	3780.0	$\frac{5}{8}$	237.583	4491.8	$\frac{7}{8}$	257.218	5264.9
$\frac{1}{2}$	218.341	3793.7	$\frac{3}{4}$	237.976	4506.7	82.	257.611	5281.0
$\frac{5}{8}$	218.733	3807.3	$\frac{7}{8}$	238.368	4521.5	$\frac{1}{8}$	258.003	5297.1
$\frac{3}{4}$	219.126	3821.0	76.	238.761	4536.5	$\frac{1}{4}$	258.396	5313.3
$\frac{7}{8}$	219.519	3834.7	$\frac{1}{8}$	239.154	4551.4	$\frac{3}{8}$	258.789	5329.4
70.	219.911	3848.5	$\frac{1}{4}$	239.546	4566.4	$\frac{1}{2}$	259.181	5345.6
$\frac{1}{8}$	220.304	3862.2	$\frac{3}{8}$	239.939	4581.3	$\frac{5}{8}$	259.574	5361.8
$\frac{1}{4}$	220.697	3876.0	$\frac{1}{2}$	240.332	4596.3	$\frac{3}{4}$	259.967	5378.1
$\frac{3}{8}$	221.090	3889.8	$\frac{5}{8}$	240.725	4611.4	$\frac{7}{8}$	260.359	5394.3
$\frac{1}{2}$	221.482	3903.6	$\frac{3}{4}$	241.117	4626.4	83.	260.752	5410.6
$\frac{5}{8}$	221.875	3917.5	$\frac{7}{8}$	241.510	4641.5	$\frac{1}{8}$	261.145	5426.9
$\frac{3}{4}$	222.268	3931.4	77.	241.903	4656.6	$\frac{1}{4}$	261.538	5443.3
$\frac{7}{8}$	222.660	3945.3	$\frac{1}{8}$	242.295	4671.8	$\frac{3}{8}$	261.930	5459.6
71.	223.053	3959.2	$\frac{1}{4}$	242.688	4686.9	$\frac{1}{2}$	262.323	5476.0
$\frac{1}{8}$	223.446	3973.1	$\frac{3}{8}$	243.081	4702.1	$\frac{5}{8}$	262.716	5492.4
$\frac{1}{4}$	223.838	3987.1	$\frac{1}{2}$	243.473	4717.3	$\frac{3}{4}$	263.108	5508.8
$\frac{3}{8}$	224.231	4001.1	$\frac{5}{8}$	243.866	4732.5	$\frac{7}{8}$	263.501	5525.3
$\frac{1}{2}$	224.624	4015.2	$\frac{3}{4}$	244.259	4747.8	84.	263.894	5541.8
$\frac{5}{8}$	225.017	4029.2	$\frac{7}{8}$	244.652	4763.1	$\frac{1}{8}$	264.286	5558.3
$\frac{3}{4}$	225.409	4043.3	78.	245.044	4778.4	$\frac{1}{4}$	264.679	5574.8
$\frac{7}{8}$	225.802	4057.4	$\frac{1}{8}$	245.437	4793.7	$\frac{3}{8}$	265.072	5591.4
72.	226.195	4071.5	$\frac{1}{4}$	245.830	4809.0	$\frac{1}{2}$	265.465	5607.9
$\frac{1}{8}$	226.587	4085.7	$\frac{3}{8}$	246.222	4824.4	$\frac{5}{8}$	265.857	5624.5
$\frac{1}{4}$	226.980	4099.8	$\frac{1}{2}$	246.615	4839.8	$\frac{3}{4}$	266.250	5641.2
$\frac{3}{8}$	227.373	4114.0	$\frac{5}{8}$	247.008	4855.2	$\frac{7}{8}$	266.643	5657.8
$\frac{1}{2}$	227.765	4128.2	$\frac{3}{4}$	247.400	4870.7	85.	267.035	5674.5
$\frac{5}{8}$	228.158	4142.5	$\frac{7}{8}$	247.793	4886.2	$\frac{1}{8}$	267.428	5691.2
$\frac{3}{4}$	228.551	4156.8	79.	248.186	4901.7	$\frac{1}{4}$	267.821	5707.9
$\frac{7}{8}$	228.944	4171.1	$\frac{1}{8}$	248.579	4917.2	$\frac{3}{8}$	268.213	5724.7
73.	229.336	4185.4	$\frac{1}{4}$	248.971	4932.7	$\frac{1}{2}$	268.606	5741.5
$\frac{1}{8}$	229.729	4199.7	$\frac{3}{8}$	249.364	4948.3	$\frac{5}{8}$	268.999	5758.3
$\frac{1}{4}$	230.122	4214.1	$\frac{1}{2}$	249.757	4963.9	$\frac{3}{4}$	269.392	5775.1
$\frac{3}{8}$	230.514	4228.5	$\frac{5}{8}$	250.149	4979.5	$\frac{7}{8}$	269.784	5791.9

CIRCUMFERENCES AND AREAS OF CIRCLES.

(CONTINUED.)

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
86.	270.177	5808.8	90. $\frac{7}{8}$	285.492	6486.0	95. $\frac{5}{8}$	300.415	7181.8
$\frac{1}{8}$	270.570	5825.7				$\frac{3}{4}$	300.807	7200.6
$\frac{1}{4}$	270.962	5842.6	91.	285.885	6503.9	$\frac{7}{8}$	301.200	7219.4
$\frac{3}{8}$	271.355	5859.6	$\frac{1}{8}$	286.278	6521.8			
$\frac{1}{2}$	271.748	5876.5	$\frac{1}{4}$	286.670	6539.7	96.	301.593	7238.2
$\frac{5}{8}$	272.140	5893.5	$\frac{3}{8}$	287.063	6557.6	$\frac{1}{8}$	301.986	7257.1
$\frac{3}{4}$	272.533	5910.6	$\frac{1}{2}$	287.456	6575.5	$\frac{1}{4}$	302.378	7276.0
$\frac{7}{8}$	272.926	5927.6	$\frac{5}{8}$	287.848	6593.5	$\frac{3}{8}$	302.771	7294.9
			$\frac{3}{4}$	288.241	6611.5	$\frac{1}{2}$	303.164	7313.8
87.	273.319	5944.7	$\frac{7}{8}$	288.634	6629.6	$\frac{5}{8}$	303.556	7332.8
$\frac{1}{8}$	273.711	5961.8	92.	289.027	6647.6	$\frac{3}{4}$	303.949	7351.8
$\frac{1}{4}$	274.104	5978.9	$\frac{1}{8}$	289.419	6665.7	$\frac{7}{8}$	304.342	7370.8
$\frac{3}{8}$	274.497	5996.0	$\frac{1}{4}$	289.812	6683.8			
$\frac{1}{2}$	274.889	6013.2	$\frac{3}{8}$	290.205	6701.9	97.	304.734	7389.8
$\frac{5}{8}$	275.282	6030.4	$\frac{1}{2}$	290.597	6720.1	$\frac{1}{8}$	305.127	7408.9
$\frac{3}{4}$	275.675	6047.6	$\frac{5}{8}$	290.990	6738.2	$\frac{1}{4}$	305.520	7428.0
$\frac{7}{8}$	276.067	6064.9	$\frac{3}{4}$	291.383	6756.4	$\frac{3}{8}$	305.913	7447.1
			$\frac{7}{8}$	291.775	6774.7	$\frac{1}{2}$	306.305	7466.2
88.	276.460	6082.1				$\frac{5}{8}$	306.698	7485.3
$\frac{1}{8}$	276.853	6099.4	93.	292.168	6792.9	$\frac{3}{4}$	307.091	7504.5
$\frac{1}{4}$	277.246	6116.7	$\frac{1}{8}$	292.561	6811.2	$\frac{7}{8}$	307.483	7523.7
$\frac{3}{8}$	277.638	6134.1	$\frac{1}{4}$	292.954	6829.5			
$\frac{1}{2}$	278.031	6151.4	$\frac{3}{8}$	293.346	6847.8	98.	307.876	7543.0
$\frac{5}{8}$	278.424	6168.8	$\frac{1}{2}$	293.739	6866.1	$\frac{1}{8}$	308.269	7562.2
$\frac{3}{4}$	278.816	6186.2	$\frac{5}{8}$	294.132	6884.5	$\frac{1}{4}$	308.661	7581.5
$\frac{7}{8}$	279.209	6203.7	$\frac{3}{4}$	294.524	6902.9	$\frac{3}{8}$	309.054	7600.8
			$\frac{7}{8}$	294.917	6921.3	$\frac{1}{2}$	309.447	7620.1
89.	279.602	6221.1				$\frac{5}{8}$	309.840	7639.5
$\frac{1}{8}$	279.994	6238.6	94.	295.310	6939.8	$\frac{3}{4}$	310.232	7658.9
$\frac{1}{4}$	280.387	6256.1	$\frac{1}{8}$	295.702	6958.2	$\frac{7}{8}$	310.625	7678.3
$\frac{3}{8}$	280.780	6273.7	$\frac{1}{4}$	296.095	6976.7			
$\frac{1}{2}$	281.173	6291.2	$\frac{3}{8}$	296.488	6995.3	99.	311.018	7697.7
$\frac{5}{8}$	281.565	6308.8	$\frac{1}{2}$	296.881	7013.8	$\frac{1}{8}$	311.410	7717.1
$\frac{3}{4}$	281.958	6326.4	$\frac{5}{8}$	297.273	7032.4	$\frac{1}{4}$	311.803	7736.6
$\frac{7}{8}$	282.351	6344.1	$\frac{3}{4}$	297.666	7051.0	$\frac{3}{8}$	312.196	7756.1
			$\frac{7}{8}$	298.059	7069.6	$\frac{1}{2}$	312.588	7775.6
90.	282.743	6361.7				$\frac{5}{8}$	312.981	7795.2
$\frac{1}{8}$	283.136	6379.4	95.	298.451	7088.2	$\frac{3}{4}$	313.374	7814.8
$\frac{1}{4}$	283.529	6397.1	$\frac{1}{8}$	298.844	7106.9	$\frac{7}{8}$	313.767	7834.4
$\frac{3}{8}$	283.921	6414.9	$\frac{1}{4}$	299.237	7125.6			
$\frac{1}{2}$	284.314	6432.6	$\frac{3}{8}$	299.629	7144.3	100.	314.159	7854.0
$\frac{5}{8}$	284.707	6450.4	$\frac{1}{2}$	300.022	7163.0			
$\frac{3}{4}$	285.100	6468.2						

WEIGHTS OF CYLINDRICAL CASTINGS IN POUNDS PER INCH

To Compute the Weight of Hollow Cylindrical Iron Castings Subtract the
Weight for Inside Diameter from the Weight for Outside Diameter
and Multiply by the Length in Inches.

Add 7% for Steel and 15% for Brass.

DIA.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
....	.....	.0034	.0137	.0309	.0550	.0859	.1237	.1684
1	.22	.2783	.3444	.4144	.4956	.5996	.6740	.7728
2	.88	.9940	1.11	1.24	1.37	1.51	1.66	1.82
3	1.98	2.15	2.32	2.51	2.69	2.89	3.09	3.30
4	3.52	3.74	3.97	4.21	4.45	4.70	4.96	5.22
5	5.50	5.78	6.06	6.35	6.65	6.96	7.27	7.59
6	7.92	8.25	8.59	8.94	9.29	9.65	10.02	10.39
7	10.77	11.16	11.56	11.96	12.37	12.78	13.21	13.64
8	14.07	14.52	14.97	15.42	15.89	16.36	16.84	17.32
9	17.81	18.31	18.81	19.33	19.85	20.37	20.90	21.44
10	22.00	22.54	23.10	23.67	24.25	24.82	25.41	26.01
11	26.61	27.22	27.83	28.45	29.08	29.72	30.36	31.01
12	31.67	32.33	33.00	33.68	34.36	35.05	35.75	36.45
13	37.16	37.88	38.61	39.34	40.08	40.82	41.58	42.34
14	43.10	43.87	44.65	45.44	46.23	47.04	47.84	48.66
15	49.48	50.31	51.14	51.98	52.83	53.69	54.55	55.42
16	56.30	57.18	58.07	58.97	59.87	60.78	61.70	62.62
17	63.55	64.49	65.44	66.39	67.35	68.31	69.29	70.27
18	71.25	72.25	73.25	74.25	75.26	76.28	77.31	78.35
19	79.39	80.43	81.49	82.55	83.62	84.70	85.78	86.87
20	87.96	89.07	90.18	91.29	92.42	93.55	94.68	95.83
21	96.98	98.14	99.30	100.47	101.65	102.84	104.03	105.23
22	106.44	107.65	108.87	110.10	111.33	112.57	113.82	115.07
23	116.33	117.60	118.88	120.16	121.45	122.74	124.04	125.35
24	126.67	127.99	129.32	130.66	132.00	133.35	134.71	136.07
25	137.44	138.82	140.21	141.60	143.00	144.40	145.82	147.24
26	148.66	150.09	151.53	152.98	154.43	155.89	157.36	158.84
27	160.32	161.80	163.30	164.80	166.31	167.82	169.35	170.88
28	172.40	173.95	175.50	177.06	178.62	180.19	181.77	183.36
29	184.94	186.54	188.15	189.76	191.38	193.00	194.60	196.30
30	197.90	199.50	201.23	202.90	204.60	206.30	207.94	209.60

These weights have been figured on the basis of 0.28 pounds per cubic inch.

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

WEIGHTS OF CYLINDRICAL CASTINGS IN POUNDS PER INCH

To Compute the Weight of Hollow Cylindrical Iron Castings, Subtract the Weight for Inside Diameter from the Weight for Outside Diameter and Multiply by the Length in Inches.

Add 7% for Steel and 15% for Brass.

DIA.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
31	211.34	213.04	214.76	216.48	217.21	219.94	221.68	223.43
32	225.20	226.95	228.70	230.50	232.30	234.00	235.90	237.70
33	239.50	241.30	243.10	245.00	246.80	248.60	250.50	252.40
34	254.20	256.00	258.00	259.90	261.70	263.60	265.50	267.50
35	269.40	271.30	273.30	275.20	277.10	279.10	281.10	283.00
36	285.00	287.00	289.00	291.00	293.00	295.00	297.00	299.00
37	301.00	303.10	305.10	307.20	309.30	311.30	313.40	315.50
38	317.50	319.60	321.70	323.80	326.00	328.10	330.20	332.30
39	334.50	336.60	338.80	341.00	343.10	345.30	347.50	349.70
40	351.90	354.00	356.30	358.50	360.70	362.90	365.20	367.40
41	369.70	371.90	374.20	376.50	378.70	381.00	383.30	385.60
42	387.90	390.20	392.60	394.90	397.20	399.60	401.90	404.30
43	406.60	409.00	411.40	413.70	416.10	418.50	420.90	423.30
44	425.70	428.20	430.60	433.00	435.50	437.90	440.40	442.90
45	445.30	447.80	450.30	452.80	455.30	457.30	460.30	462.80
46	465.30	467.90	470.40	472.90	475.50	478.00	480.60	483.20
47	485.80	488.40	491.00	493.60	496.20	498.80	501.40	504.00
48	506.70	509.30	512.00	514.60	517.30	521.00	522.60	525.30
49	528.00	530.70	533.40	536.10	538.80	541.60	544.30	547.00
50	549.80	552.50	555.30	558.10	560.80	563.60	566.30	569.20
51	572.00	574.80	577.60	580.40	583.30	586.10	588.90	591.80
52	594.60	597.60	600.40	603.30	606.10	609.00	611.80	614.90
53	617.70	620.60	623.60	626.50	629.40	632.40	635.30	638.30
54	641.20	644.20	647.20	650.20	653.20	656.20	659.20	662.20
55	665.00	668.00	671.00	674.00	677.00	680.00	683.00	686.00
56	690.00	693.00	696.00	699.00	702.00	705.00	708.00	711.00
57	714.00	718.00	721.00	724.00	727.00	730.00	733.00	736.00
58	740.00	743.00	746.00	749.00	753.00	756.00	759.00	762.00
59	766.00	769.00	772.00	775.00	779.00	782.00	785.00	788.00
60	791.00	795.00	798.00	802.00	805.00	808.00	811.00	815.00

These weights have been figured on the basis of 0.28 pound per cubic inch

WEIGHTS OF CYLINDRICAL CASTINGS IN POUNDS PER INCH

To Compute the Weight of Hollow Cylindrical Iron Castings, Subtract the
Weight for Inside Diameter from the Weight for Outside Diameter
and Multiply by the Length in Inches.

Add 7% for Steel and 15% for Brass.

DIA.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
61	818	822	825	829	832	835	839	842
62	845	849	852	856	859	862	866	869
63	873	876	880	883	887	890	894	897
64	901	904	908	911	915	918	922	926
65	929	933	936	940	944	947	951	954
66	958	962	965	969	972	976	980	984
67	987	991	995	998	1002	1006	1009	1013
68	1017	1021	1024	1028	1032	1036	1039	1043
69	1047	1051	1054	1058	1062	1066	1070	1074
70	1077	1081	1085	1089	1093	1097	1101	1105
71	1109	1112	1116	1120	1124	1128	1132	1136
72	1140	1144	1148	1152	1156	1160	1164	1168
73	1172	1176	1180	1184	1188	1192	1196	1200
74	1204	1208	1212	1217	1221	1225	1229	1233
75	1237	1241	1245	1249	1254	1258	1262	1266
76	1270	1274	1278	1283	1287	1291	1295	1300
77	1304	1308	1312	1317	1321	1325	1329	1333
78	1338	1342	1347	1351	1355	1359	1364	1368
79	1373	1377	1381	1385	1390	1394	1399	1403
80	1407	1412	1416	1421	1425	1429	1434	1438
81	1443	1447	1452	1456	1461	1465	1470	1474
82	1479	1483	1488	1492	1497	1501	1506	1510
83	1515	1520	1524	1529	1533	1538	1543	1547
84	1551	1556	1561	1565	1570	1575	1579	1584
85	1589	1593	1598	1603	1607	1611	1617	1622
86	1627	1631	1636	1641	1646	1650	1655	1660
87	1665	1669	1674	1679	1684	1688	1693	1698
88	1703	1708	1713	1718	1722	1727	1732	1737
89	1742	1747	1752	1757	1761	1767	1771	1776
90	1781	1786	1791	1796	1801	1806	1811	1816

These weights have been figured on the basis of 0.28 pound per cubic inch.

WEIGHTS OF CYLINDRICAL CASTINGS IN POUNDS PER INCH

To Compute the Weight of Hollow Cylindrical Iron Castings Subtract the
Weight for Inside Diameter from the Weight for Outside Diameter
and Multiply by the Length in Inches.

Add 7% for Steel and 15% for Brass.

DIA.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
91	1821	1826	1831	1836	1841	1846	1851	1856
92	1861	1866	1872	1877	1882	1887	1892	1897
93	1902	1907	1912	1917	1922	1928	1933	1938
94	1943	1948	1953	1959	1964	1969	1974	1980
95	1985	1990	1995	2000	2006	2011	2016	2021
96	2027	2032	2037	2043	2048	2053	2059	2064
97	2069	2075	2080	2085	2090	2096	2101	2107
98	2112	2117	2123	2128	2134	2139	2145	2150
99	2158	2161	2166	2172	2177	2183	2188	2194
100	2199	2204	2210	2216	2221	2227	2232	2238
101	2243	2249	2255	2261	2266	2272	2279	2283
102	2288	2294	2300	2306	2311	2317	2323	2328
103	2333	2340	2344	2351	2357	2362	2368	2374
104	2379	2385	2391	2397	2402	2408	2414	2420
105	2425	2431	2437	2443	2449	2454	2460	2466
106	2471	2478	2484	2489	2495	2501	2507	2511
107	2518	2525	2531	2536	2542	2548	2554	2560
108	2565	2572	2578	2584	2590	2596	2602	2608
109	2613	2620	2626	2632	2638	2644	2650	2656
110	2661	2668	2674	2680	2686	2692	2698	2705
111	2710	2717	2723	2729	2735	2741	2747	2754
112	2759	2766	2772	2778	2784	2791	2797	2803
113	2808	2815	2822	2828	2834	2840	2847	2853
114	2858	2865	2872	2878	2884	2891	2897	2903
115	2908	2916	2922	2929	2935	2941	2948	2954
116	2959	2967	2973	2979	2986	2992	2999	3005
117	3010	3018	3024	3031	3037	3044	3050	3057
118	3062	3070	3076	3083	3089	3096	3102	3109
119	3114	3122	3129	3135	3142	3148	3155	3161
120	3167	3175	3181	3188	3194	3201	3208	3214

These weights have been figured on the basis of 0.28 pound per cubic inch.

Decimals of a Foot for each 1-64 of
an Inch.

Inch.	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0	.0	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
$\frac{1}{64}$	.0013	.0846	.1680	.2513	.3346	.4180	.5013	.5846	.6680	.7513	.8346	.9180
$\frac{1}{32}$	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193
$\frac{3}{64}$	.0039	.0872	.1706	.2539	.3372	.4206	.5039	.5872	.6706	.7539	.8372	.9206
$\frac{1}{16}$	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
$\frac{5}{64}$	.0065	.0898	.1732	.2565	.3398	.4232	.5065	.5898	.6732	.7565	.8398	.9232
$\frac{3}{32}$	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245
$\frac{7}{64}$	.0091	.0924	.1758	.2591	.3424	.4258	.5091	.5924	.6758	.7591	.8424	.9258
$\frac{1}{8}$	.0104	.0937	.1771	.2604	.3437	.4271	.5104	.5937	.6771	.7604	.8437	.9271
$\frac{9}{64}$	.0117	.0951	.1784	.2617	.3451	.4284	.5117	.5951	.6784	.7617	.8451	.9284
$\frac{5}{32}$	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297
$\frac{11}{64}$	.0143	.0977	.1810	.2643	.3477	.4310	.5143	.5977	.6810	.7643	.8477	.9310
$\frac{3}{16}$	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
$\frac{13}{64}$	.0169	.1003	.1836	.2669	.3503	.4336	.5169	.6003	.6836	.7669	.8503	.9336
$\frac{7}{32}$	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349
$\frac{15}{64}$	.0195	.1029	.1862	.2695	.3529	.4362	.5195	.6029	.6862	.7695	.8529	.9362
$\frac{1}{4}$	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
$\frac{17}{64}$	.0221	.1055	.1888	.2721	.3555	.4388	.5221	.6055	.6888	.7721	.8555	.9388
$\frac{9}{32}$	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401
$\frac{19}{64}$	.0247	.1081	.1914	.2747	.3581	.4414	.5247	.6081	.6914	.7747	.8581	.9414
$\frac{1}{2}$	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
$\frac{21}{64}$	.0273	.1107	.1940	.2773	.3607	.4440	.5273	.6107	.6940	.7773	.8607	.9440
$\frac{11}{32}$	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453
$\frac{23}{64}$	.0299	.1133	.1966	.2799	.3633	.4466	.5299	.6133	.6966	.7799	.8633	.9466
$\frac{3}{8}$	.0312	.1146	.1979	.2812	.3646	.4479	.5312	.6146	.6979	.7812	.8646	.9479
$\frac{25}{64}$	.0326	.1159	.1992	.2826	.3659	.4492	.5326	.6159	.6992	.7826	.8659	.9492
$\frac{13}{32}$	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505
$\frac{27}{64}$	.0352	.1185	.2018	.2852	.3685	.4518	.5352	.6185	.7018	.7852	.8685	.9518
$\frac{7}{16}$	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
$\frac{29}{64}$	.0378	.1211	.2044	.2878	.3711	.4544	.5378	.6211	.7044	.7878	.8711	.9544
$\frac{15}{32}$	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557
$\frac{31}{64}$	.0404	.1237	.2070	.2904	.3737	.4570	.5404	.6237	.7070	.7904	.8737	.9570
$\frac{1}{2}$	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583

PITTSBURGH VALVE, FOUNDRY AND CONSTRUCTION CO.

Decimals of a Foot for each 1-64 of an Inch.

Inch.	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
$\frac{1}{2}$	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583
$\frac{3}{32}$	.0430	.1263	.2096	.2930	.3763	.4596	.5430	.6263	.7096	.7930	.8763	.9596
$\frac{1}{16}$	.0443	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609
$\frac{3}{64}$	.0456	.1289	.2122	.2956	.3789	.4622	.5456	.6289	.7122	.7956	.8789	.9622
$\frac{1}{8}$	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635
$\frac{5}{64}$	.0482	.1315	.2148	.2982	.3815	.4648	.5482	.6315	.7148	.7982	.8815	.9648
$\frac{1}{4}$	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661
$\frac{3}{16}$	.0508	.1341	.2174	.3008	.3841	.4674	.5508	.6341	.7174	.8008	.8841	.9674
$\frac{5}{8}$	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
$\frac{11}{64}$	.0534	.1367	.2201	.3034	.3867	.4701	.5534	.6367	.7201	.8034	.8867	.9701
$\frac{3}{8}$	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714
$\frac{13}{64}$	.0560	.1393	.2227	.3060	.3893	.4727	.5560	.6393	.7227	.8060	.8893	.9727
$\frac{1}{2}$	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740
$\frac{15}{64}$	.0586	.1419	.2253	.3086	.3919	.4753	.5586	.6419	.7253	.8086	.8919	.9753
$\frac{7}{16}$	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766
$\frac{17}{64}$	.0612	.1445	.2279	.3112	.3945	.4779	.5612	.6445	.7279	.8112	.8945	.9779
$\frac{3}{4}$	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
$\frac{19}{64}$	.0638	.1471	.2305	.3138	.3971	.4805	.5638	.6471	.7305	.8138	.8971	.9805
$\frac{5}{16}$	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818
$\frac{11}{32}$	.0664	.1497	.2331	.3164	.3997	.4831	.5664	.6497	.7331	.8164	.8997	.9831
$\frac{1}{8}$	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
$\frac{21}{64}$	.0690	.1523	.2357	.3190	.4023	.4857	.5690	.6523	.7357	.8190	.9023	.9857
$\frac{9}{32}$	.0703	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870
$\frac{23}{64}$	.0716	.1549	.2383	.3216	.4049	.4883	.5716	.6549	.7383	.8216	.9049	.9883
$\frac{5}{8}$	.0729	.1562	.2396	.3229	.4062	.4896	.5729	.6562	.7396	.8229	.9062	.9896
$\frac{25}{64}$	.0742	.1575	.2409	.3242	.4076	.4909	.5742	.6576	.7409	.8242	.9076	.9909
$\frac{11}{16}$	.0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922
$\frac{27}{64}$	.0768	.1602	.2435	.3268	.4102	.4935	.5768	.6602	.7435	.8268	.9102	.9935
$\frac{3}{8}$	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948
$\frac{29}{64}$	.0794	.1628	.2461	.3294	.4128	.4961	.5794	.6628	.7461	.8294	.9128	.9961
$\frac{13}{32}$	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974
$\frac{31}{64}$	.0820	.1654	.2487	.3320	.4154	.4987	.5820	.6654	.7487	.8320	.9154	.9987
1												1.0000

Decimals for Fractions of an Inch.

	$\frac{1}{32}$	$\frac{1}{64}$			$\frac{1}{32}$	$\frac{1}{64}$	
		1	.015625			33	.515625
		2	.03125		17	34	.53125
		3	.046875			35	.546875
$\frac{1}{16}$	2	4	.0625	$\frac{9}{16}$	18	36	.5625
		5	.078125			37	.578125
	3	6	.09375		19	38	.59375
		7	.109375			39	.609375
$\frac{1}{8}$	4	8	.125	$\frac{5}{8}$	20	40	.625
		9	.140625			41	.640625
	5	10	.15625		21	42	.65625
		11	.171875			43	.671875
$\frac{3}{16}$	6	12	.1875	$\frac{11}{16}$	22	44	.6875
		13	.203125			45	.703125
	7	14	.21875		23	46	.71875
		15	.234375			47	.734375
$\frac{1}{4}$	8	16	.25	$\frac{3}{4}$	24	48	.75
		17	.265625			49	.765625
	9	18	.28125		25	50	.78125
		19	.296875			51	.796875
$\frac{5}{16}$	10	20	.3125	$\frac{13}{16}$	26	52	.8125
		21	.328125			53	.828125
	11	22	.34375		27	54	.84375
		23	.359375			55	.859375
$\frac{3}{8}$	12	24	.375	$\frac{7}{8}$	28	56	.875
		25	.390625			57	.890625
	13	26	.40625		29	58	.90625
		27	.421875			59	.921875
$\frac{7}{16}$	14	28	.4375	$\frac{15}{16}$	30	60	.9375
		29	.453125			61	.953125
	15	30	.46875		31	62	.96875
		31	.484375			63	.984375
$\frac{1}{2}$	16	32	.5	1	32	64	1.00

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WORKING AND TEST PRESSURES FOR VALVES

TYPES OF VALVES	Valve No.	Working Pressures			Test Pressure	Price Page	Dimension Page
		Water		Air or Gas			
		Lbs. per Sq. In.	Lbs. per Sq. In.	Lbs. per Sq. In.			
GATE VALVES							
Low Pressure, 14" to 32", Flanged	1P	50	25	25	50	56	362 to 366
Low Pressure, above 32", Flanged—Plain	1P	30	15	15	30	56	
Low Pressure, above 32", Flanged—Ribbed	1P	50	25	25	50	56	
Low Pressure, 14" to 30", Bowl	1P	50	25	25	50	57	
Standard 12" and smaller, Flanged	2P	175	125	125	250	85 to 86	384 to 387
Standard 14" and 16", Flanged	2P	150	125	125	250		
Standard 18" to 32", Flanged	2P	120	100	100	200		
Standard 36" and larger, Flanged	2P	120	100	100	150		
Standard 12" and smaller, Bowl	2P	175			300	87	388
Standard 14" to 16", Bowl	2P	150			250	87	388
Standard 18" and larger, Bowl	2P	120			200	87	388
Standard Quick Opening 2" to 4"	2P	125			250	88	389
Standard Quick Opening 5" to 8"	2P	50			250	88	389
Standard Quick Opening 10" and 12"	2P	15			250	88	389
Standard Quick Opening 14" to 16"	2P	10			250	88	389
Medium Parallel Seat	3P	200	175		500	125	410
Medium Taper Seat	3T	200	175		500	127	411-412
Extra Heavy, 12" and smaller—Semi Steel	4T	400	250		800	133	413
Extra Heavy, 14" to 18", Semi Steel	4T	300	250		800	133	to
Extra Heavy, 20" to 24", Semi Steel	4T	300	250		600	133	415
Extra Heavy, Brass	4	400	250		800	134	416
Extra Heavy, Cast Steel, 4" and smaller	4S	450	350		1000	195	453
Extra Heavy, Cast Steel, 5" to 12"	4S	450	350		800	to	to
Extra Heavy, Cast Steel, 14" and larger	4S	400	350		600	196	455
Extra Heavy for Gas, 3" to 12"	4P	400		400	800	314	508
Extra Heavy for Gas above 12", Plain	4P	400		400	600	314	to
Extra Heavy for Gas above 12", ribbed	4P	400		400	800	314	509
Double Extra Strong for Gas	5P			1000	1500	323	514
800 Lb. Hydraulic American Standard—Static	5P	800		800	1500	253	469
800 Lb. Hydraulic American Standard—Shock	5P	500			1500	253	469
1000 Lb. Hydraulic Pittsburgh Standard—Shock	6T	1000			2000	261	474
1200 Lb. Hydraulic American Standard—Static	6T	1200		1200	2000	284	491
1200 Lb. Hydraulic American Standard—Shock	6T	800			2000	284	491
3000 Lb. Hydraulic American Standard—Static	7T	3000		3000	3500	295	497
3000 Lb. Hydraulic American Standard—Shock	7T	2000			3500	295	497
3000 Lb. Hydraulic Pittsburgh Standard—Shock	8T	3000			4000	302	501
GLOBE, ANGLE OR CROSS VALVES							
Standard Cast Iron—14" and smaller	2	175	125		300	90	390
Extra Heavy, Semi Steel	4	400	250		800	135	417
Extra Heavy, Cast Steel	4	400	350		800	198	456
Extra Heavy, Brass	4	400	250		800	136	418
Extra Heavy, Hydraulic, Bronze, 1/2" and 3/4"		3000			4000	292	495
Extra Heavy, Hydraulic, Bronze, 1" and 1 1/4"		2500			3500	292	495
Extra Heavy, Hydraulic, Bronze, 1 1/2" and 2"		1500			2500	292	495
CHECK VALVES							
Standard Cast Iron	2	175			300	94	392
Extra Heavy, Semi Steel	4	400	250		800	137	419
Extra Heavy, Cast Steel	4		350		800	200	457
Extra Heavy, Brass	4	400	250		800	138	418
Extra Heavy, for Gas	4			400	800	315	510
Double Extra Heavy for Gas	5			1000	1500	324	515
3000 Pound Hydraulic American Standard—Static	7	3000		3000	3500	296	498
3000 Pound Hydraulic American Standard—Shock	7	2000			3500	296	498
Extra Heavy, Hydraulic, Bronze, 1/2" and 3/4"		3000			4000	293	495
Extra Heavy, Hydraulic, Bronze, 1" and 1 1/4"		2500			3500	293	495
Extra Heavy, Hydraulic, Bronze, 1 1/2" and 2"		1500			2500	293	495
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Extra Heavy, Semi Steel	4		250		800	142-143	420-421
Extra Heavy, Cast Steel	4		350		800	203-204	458-459
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TANNER VALVES		1000			2000	271	480-481
AIKEN VALVES		1000			2000	274-275	482-485
STUART VALVES		2000			2500	291	494
PLUG VALVES		1000			2000	264	476
EXHAUST RELIEF VALVES					25	61	369
FLOAT VALVES					300	92	391
ACCUMULATOR VALVES					800		423
THROTTLE VALVES—Semi Steel	4		250		800	148	425
THROTTLE VALVES—Cast Steel	4		350		800	199	460

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